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To the memory of my father, Francesco

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* * * * * * * * * * * * * * * * *

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Abstract

This dissertation is a collection of three independent essays in Applied Economics, Migration and Conflict. Chapter 2 focuses on the interconnectedness between labour market division, economic rents concentration, political extremism, and ethnic conflict. A natural experiment of history that occurred in the late 1960s in South Tyrol, a northernmost and predominantly German-speaking region of Italy, is exploited to investigate whether frictions in the labour market may induce a move in the voting preferences of a privileged minority group towards a more extremist political party. Chapter 3 builds on propositions from Latané's Dynamic Social Impact Theory (Latané, 1981, 1996) to analyse the evolution and diffusion of anti-immigrant attitudes across European NUTS2 regions between 2002 and 2014. The identification of a spatially dependent diffusion and clustering process of anti-immigrant attitudes has a significant bearing for the understanding of the rise and fall of populist movements across Europe and changing electoral support for xenophobic parties across European regions over time. The last chapter explores the extent to which scientific migration and mobility barriers shape processes of scientific knowledge production and dissemination.

Chapter 1

Introduction

Fluere is a Latin verb used to indicate a flow of any animated or unanimated *object*. The flowing of any such *object* carries along information and brings about changes to both departure and destination environments. This work is made up of three essays, each dealing to a broader or lesser extent with a very particular case of flow, the one where the *objects* are humans: migration. Humans (i) carry information along the journey -their costumes, principles and actions; and (ii) bring about changes -departure and destination environments have to rearrange and adapt until a new equilibrium state is reached. Both points (i) and (ii) represent the figurative cornerstones and physical boundaries of this work, the abstraction level of which is set by the econometric techniques used to evaluate documented historical happenings and measurable changing quantities.

..... ✶ .....

The international migrant population has grown markedly in scale over the past four-and-a-half decades. In 2015, a total of 244 million people was living in a country other than their country of birth, a three-time higher figure than the 84 million estimated in 1970, with Asia and Europe hosting more than half of the global international migrant stock (IOM (2017)). Such a steep rise in the share of foreign-born people has posed major policy challenges for countries around the globe, involving employment, education, housing, social services, and national security, inter alia.

Migrant inflows have been increasingly perceived and thought of as

representing a threat to the economic, cultural, and social status quo and future prospects. Governments have been implementing tighter immigration policies, even in traditionally more liberal and open contexts such as Sweden, where on 21 June 2016, the Swedish Parliament adopted legislative changes that introduced a temporary 3-year (13-month) residence permit for those granted refugee (subsidiary protection) status and limited remarkably the possibilities of asylum seekers to be reunited with their families. Political parties with anti-immigrant actions at the core of their agendas have been gaining broader electoral consensus. In the 2014 General election, the *Sverigedemokraterna* became Sweden's third biggest party, securing almost 13% of the electoral favours; the *Dansk Folkeparti* in Denmark won 21.1% of the vote in 2015, almost doubling its support since the previous 2011 general election and, in 2015, the *Schweizerische Volkspartei* obtained a record 29.4% of the vote in Switzerland. More recently, in the presidential election in Austria, the candidate of the *Freedom Party of Austria*, Norbert Hofer, won 48% of votes and, in October 2017, the same party secured 51 seats (out of 183) in the Austrian Parliament.

The rise in international migration coupled with the natives' perception of enhanced hostility towards immigrants and the recent shifts in many countries towards tighter immigration policies and increasing electoral support for more extremist political parties have all triggered a resurgence of interest in exploring determinants, processes, and outcomes of people moving across and within national boundaries. Economists have traditionally focused on investigating theoretically and empirically the impact of immigration on the labour market and welfare system in receiving countries: do immigrants take jobs away from natives and reduce their wages? Since immigrants pay taxes and use public services in many forms (including public education and healthcare, public safety, public spaces such as roads, parks and recreation facilities, and various types of welfare assistance), are they net contributors or net recipients of benefits of the welfare state? Most empirical studies have detected slightly positive or non-existent *average* effects of immigration on natives' wage and employment levels, although natives with skill endowments similar to those of the newcomers have been found to exhibit

a higher degree of vulnerability (see, e.g., Borjas (2014); D' Amuri and Peri (2014); Dustmann et al. (2012); Manacorda et al. (2012); Ottaviano and Peri (2012)). It has been also documented that in the short-run, depending on how quickly the economy and the labour demand adjust to immigration-induced labour supply shocks, wage and employment can be impacted negatively (see, e.g., Borjas (2017); Borjas and Monras (2017); Hunt (1992)). As for the immigration-public finances nexus, the evidence is mixed and heavily reliant on the approach (static accounting or dynamic) used and the relative assumptions made (see, e.g., Bonin (2006); Bonin et al. (2000); Dustmann and Frattini (2014); Liebig and Mo (2013)).

More recently, scholars have also devoted a great deal of attention to establishing causal links between immigration and variables such as crime, terrorism, and political outcomes. Unlike common perceptions, migrant inflows have not been reported to induce terrorist attacks (Bove (2016)) or to affect overall crime rates (Bianchi et al. (2012)); rather, they have been found to only increase the incidence of particular types of crime (Bell et al. (2013); Spenkuch (2013)). As for the political outcomes, it has been documented that changes in the share of immigrants cause a significant increase in the share of votes or seats secured by anti-immigrant nationalist parties (see, e.g., Becker et al. (2016a); Halla et al. (2017a); Harmon (2017); Otto and Steinhardt (2014)).

Although independent of one another, each of the three essays this work is made up of touches either marginally or to a deeper extent some peculiar yet characterizing sides (and relevant facets for our times) of the complex migration phenomenon. In chapter 2, migration is a mere instrument to address an endogeneity issue related to people's settlement choice that arises when empirically investigating the interconnectedness between labour market division, economic rents concentration, political extremism, and ethnic conflict. To successfully implement its programme to denationalise South Tyrol and the South Tyrolese, the fascist regime relied heavily on incentivizing massive movements of workers and their families from other Italian regions to South Tyrol through development of industrial zones and construction of public houses. We exploit the resulting steep increase in the number of registrations at the

Registry Office for change of residence from another Italian municipality that occurred from 1932 onwards to recover exogenous variation from an endogenous regressor (the share of Italians residing in South Tyrolean municipalities) and establish a causal link between this regressor and changes in the electoral support for a right-wing post-fascist party. The instrument represents, however, only a small ingredient within a wide non-migration-related context. The Chapter studies how and to what extent political attitudes of ethnic minorities change when a majority group threatens their established economic rents. We exploit a natural experiment of history that occurred in the late 1960s in South Tyrol, a northernmost and predominantly German-speaking region of Italy. During the 1930s, the region underwent a massive process of Italianization that strengthened markedly entry barriers into public offices for the German- relative to the Italian speaking population. Because of their comparative advantage, Italians specialized as public servants and settled sparsely across South Tyrolean municipalities to cover public posts. By 1939 more than 95% of all public posts were in the hands of Italians, although German speakers accounted for 75% of the total population. This ethnic division of the labour market, however, was brought back to question in 1966 by a reform package that aimed at redistributing jobs in the public administration sector proportionally to the numerosity of each language group. Following the announcement of the reform, we document: (i) an increase in the vote share of the post-fascist party in the general elections; (ii) a higher support for the post-fascist party in those municipalities where Italians were fewer; and (iii) an even higher support for the post-fascist party in those municipalities where Italians were more specialized as public officers. As of point (ii), since the political structure of the municipalities might drive the settlement of the Italian-speaking population, we further instrument for the Italian share of the population with migration inflows from neighbouring Italian regions in the 1930s, the number of housing units built in the 1919-1945 period, and an indicator of the municipalities served by stations along the Brenner railway route. We interpret the results as evidence of members of a minority group developing political extremist preferences when fearing to lose

their historically-established economic rents. Results appear very robust to potential alternative mechanisms -specialization of Italians in other activity sectors, terrorist attacks, and relative income considerations.

Conversely, both chapter 3 and chapter 4 take migration up as their core theme. Chapter 3 focuses on Europeans' attitudes towards migrants. Europe has become a major destination for international migrants. By 2015, 34.3 million people living in an EU member state were born outside of the EU-28, and an additional 18.5 million persons had been born in another EU country than the one currently residing in (Eurostat). We explore the extent to which anti-immigrant hostility is spatially dependent and has spread geographically across European regions. Based on data from seven rounds (2002-2014) of the European Social Survey (ESS), analysed at sub-national (NUTS 2 regions) levels, and exploiting propositions of the Dynamic Social Impact Theory, we identify a significant spatial connectivity of anti-immigrant attitudes by showing that spatially more proximate European regions share similar in trends in anti-immigrant attitudes than we observe between more distant regions. Our spatial-lag baseline model specification predicts that a one percentage point increase in the percentage of respondents with hostile attitudes against immigrants of the same race or ethnicity as the majority population in spatially more proximate regions raises the percentage of respondents with similar anti-immigrant attitudes in the reference region by 0.480 percentage points. The identification of a spatially dependent diffusion and clustering process of anti-immigrant attitudes has significant bearing for the understanding of the rise and fall of populist movements across Europe and changing electoral support for xenophobic parties across European regions over time.

Chapter 4 explores the relationship between academic mobility, international research collaborations and mobility barriers. International research collaborations have been growing notably, both in magnitude and relevance, over the last decades favoured by the introduction and spread of new transportation and communication technologies. E-mail, fax machines, the Internet, (multi-point) video conferencing, cheap flights have all made interactions between researchers far easier, even when sepa-

rated by great distances. Despite this, physical co-location is still identified as a critical factor in facilitating the transfer and exchange of (tacit) knowledge through face-to-face interaction and informal communication. Close spatial proximity, however, is not always possible to attain. The ability of researchers from different countries to temporarily colocate depends heavily on such factors as travel barriers that might severely condition their mobility. We specifically test hypotheses on the role of scientific mobility and visa policy in influencing patterns of international research collaborations proxied by the number of internationally co-authored publications. By using bibliometric data from Elsevier's Scopus database, we track international flows of scientists migrating between institutions in more than 194 countries and record international research collaborations between 1973 and 2013. Through Poisson maximum likelihood estimation of structural gravity-type models, we find strong evidence that both scientific mobility and visa restrictions shape the emergence and direction of international research.

Chapter 2

From Italianization to Germanization: Division of Labor, Economic Rents, and Political Extremism in South Tyrol

2.1 Introduction

A large strand of literature has been documenting how ethnic conflicts generate economic losses, political distortion, weak institutions, and corruption (Blattman and Miguel (2010); Easterly and Levine (1997); Montalvo and Reynal-Querol (2005)). Several authors have focused on their determinants, with some pointing out cultural factors (Voigtländer and Voth (2015)), while others scrutinizing their economic roots (Becker et al. (2016b); Grosfeld et al. (2017)). In this paper, we use a quasi-experimental design to investigate whether frictions in the labor market prompt salience in the ethnic conflict and induce a shift in voting towards extremist political platforms in a privileged minority group.

We document a unique natural experiment of history that occurred

in the 1960s in South Tyrol, a northernmost and predominantly German-speaking region of Italy. After its annexation to Italy in 1919, South Tyrol underwent a massive process of Italianization that banned the use of German and arose legal barriers in the labor market for public officers. Because of their comparative advantage in speaking the official language, Italian specialized as public servants and, except for the biggest towns, settled sparsely across Tyrolean municipalities to cover public posts. The resulting ethnic division of labour was brought back to question in the late 1960s by the announcement of a new reform package that was aimed at redistributing jobs in the public administration sector proportionally to the numerosity of each language group.

We empirically investigate how a sparse minority, highly specialized in the labor market, reacts to the panic that broke out after the announcement of a reform that was likely to erode its economic rents. Following the announcement of the reform (but before its full implementation), we document: (i) an increase in the vote share in the General elections to the Lower Chamber of Deputies for the *Movimento Sociale Italiano* (MSI), a post-fascist party that had as main goal the defence of the *Italianness*, in municipalities where the reform was likely to redistribute public posts; (ii) a higher support for the MSI in municipalities where Italians were fewer; and (iii) an even higher support for the MSI in municipalities where Italians were more specialized as public officers.

To document these facts, we combine data on anti-Germans political preferences of the Italian group, linguistic groups composition of the population, and a wide set of information regarding the occupation in the labor market of each linguistic group. In our baseline analysis we employ a standard difference-in-differences strategy and exploit two sources of variation. First, following international pressures and a ten-year period of terrorist attacks, in 1966 the Italian government resumed negotiations with Austria and proposed an all-inclusive reform offer, the so-called "Package", that was aimed to grant a large amount of autonomy to the region and more rights to the German group. Second, we exploit the difference in the population composition between South Tyrol and the Trentino region. Despite being both part of the

Austrian-Hungarian Empire prior to the annexation to Italy in 1919, the Trentino was entirely populated by Italians. As soon as the two areas were added to Italy, they were merged onto forming the twentieth Italian region, named as *Trentino-Alto Adige*. While the "Package" also involved Trentino—they split the region Trentino-Alto Adige into two autonomous provinces, the province of Trent and that of Bolzano—they were unlikely to redistribute established economic rents to members of other ethnic groups, as Germans were practically absent. In our baseline estimation, we therefore compare the relative change in the vote share of the Italians to the MSI in the post-announcement period of the "Package" relative to the pre-announcement period between municipalities that were likely to be affected (i.e., those in South Tyrol) and those that were unlikely to be affected (i.e., those in Trentino).

An important premise to our analysis is that the South Tyrolean question was a conflict preponderantly conducted by the two central governments of Rome and Vienna. Vienna pushed for the re-annexation of Bolzano to the rest of Tyrol, one of the largest Austrian region in its western side; Rome claimed that Bolzano would remain in Italian hands as the "natural" border of the country was the Alpine arch.[1] The evolution of the conflict strictly follows the distribution of political power between Austria and Italy. As long as Austria remained divided among the Ally forces (United States, United Kingdom, France, and Soviet Union) the South Tyrolean question did not come out. When Austria regained independence in 1955, Vienna began to claim Bolzano back. As the Italian answer was firmly negative, German-speaking South Tyroleans organized themselves in terrorist groups with the intention to let the question be included on the Italian political agenda.[2] The terrorist wave lasted for more than 15 years. Official reports count 288 terrorist attacks between 1956 and 1974, 94% of which occurring in the province of Bolzano, and 19

[1] South Tyrol is also referred to as *Cisalpine Tyrol*, while the rest of Tyrol is also known as *Transalpine Tyrol*.

[2] According to the official reports (see the *Elenco delle sentenze per fatti di terrorismo dal 1956 al 1988*, Procura della Repubblica presso il Tribunale di Bolzano), Italian Courts sentenced 157 terrorists of which 103 South Tyroleans, 40 Austrian citizens, and 14 German citizens (of the Federal Republic of Germany).

deads among Italians. The reply of Rome was harsh and Austria could not enter the European Economic Community because of the Italian veto. The escalation of the terror led the newly elected Italian Prime Minister Aldo Moro to commit to a solution of the South Tyrolean question beginning with the 1966 that eventually leads to the adoption of the "Package" in 1972.

Our baseline estimates show that after the announcement of the "Package" Italians living in South Tyrol increase on average their support for the MSI, relative to those living in Trentino, of 4.15 percentage points—about 56% of the average MSI vote share in the two regions. However, we argue and document that this result masks two sources of heterogeneity. First, as Figure 1 illustrates, Italians' settlement across Tyrolean villages was substantially various. We document that this spatial distribution was the result of legal barriers to public offices imposed on the German-speaking population during the Italianization of the region. In line with a story of concentration of economic rents we then show that, after the announcement of the "Package", anti-Germans political preferences increased the most in municipalities where Italians were fewer. To establish causality, we exploit exogenous variation in the Italian settlement by collecting data from the fascist epoch when the Italianization process of the South Tyrol had its start. First, we assemble data on the migration inflows from the neighbouring Italian provinces during the thirties. Second, we use information of the number of housing units built by the fascist regime for Italians' settlement purposes. We then complement this information with data on the route of the pre-existent Austrian railway, built at the end of the nineteenth century to connect Italy and Austria. The 2SLS estimations are negative and significant and larger than those obtained using OLS.

The second source of heterogeneity we use to uncover the effect of the panic that broke out after the announcement of the "Package" on the rise of anti-German attitudes is the spatial distribution in the share of public servants among Italians. As Figure 2 illustrates, Italians specialized as public servants in the smallest Tyrolean villages, at the northern boundary of the region, where more than half of them was employed

in the public administration. We show that this variation explains the entire shift in anti-Germans attitudes that we obtained in the difference-in-differences estimation. This result is extremely robust to the inclusion of a large number of controls as well as on using alternative measures of concentration in the labor market. Moreover, we test potential mechanisms, alternative to the above explanation. We provide evidence that variation in the exposure to terrorist attacks or in the relative income of ethnic groups cannot explain the rise of anti-German attitudes after the announcement of the "Package".

To see why frictions in the labor market for public servants became salient in late 1960s so as to induce extremism in anti-German attitudes and an increase in the support for the MSI, Figure 3 scatters South Tyrolean municipalities according to the share of public servants among Italians (in y-axis) and the share of Italians (in the x-axis) as reported in the Census of 1961. The Italianization of the South Tyrol produces persistent distortions in the public servants labor market in favor of Italians that were still at work after thirty years and after the dissolution of the Fascist regime and the birth of the Italian Republic. In municipalities where Italians were only the 20% of the total population, for instance, they highly specialized and, in some cases, more than 80% of them occupied a public post. The announcement of the "Package" in 1966 put at risk their historically established economic rents. The "Package", in fact, by proposing a redistribution of posts in the public administration sector proportionally to the numerosity of each language group, was to move the distribution downward up to the 45-degree line were public post proportional to the numerosity of each linguistic group with a consequent economic loss for the Italian group. Our estimates imply that municipalities with a standard deviation above the mean in the share of public servants among Italians increase their support for the MSI by 3.72 percentage points after the announcement of the "Package" (but before its implementation). We interpret this result as evidence of the salience of ethnic conflict when institutional changes induce competition between ethnic groups and put at risk historical-established economic rents of a privileged group.

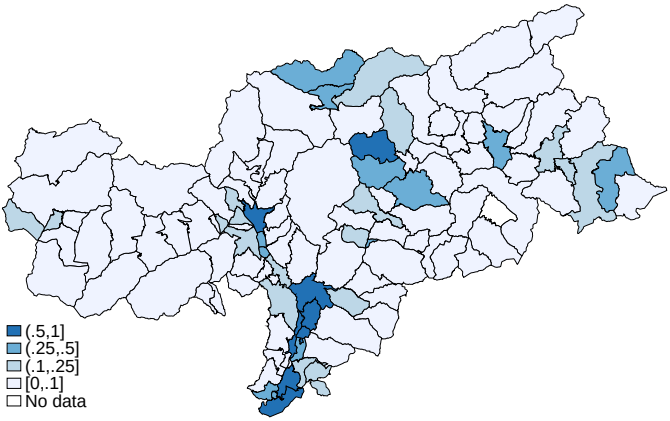


Figure 1: Spatial distribution of the Italian language group across South Tyrolean municipalities in 1961 (shares).

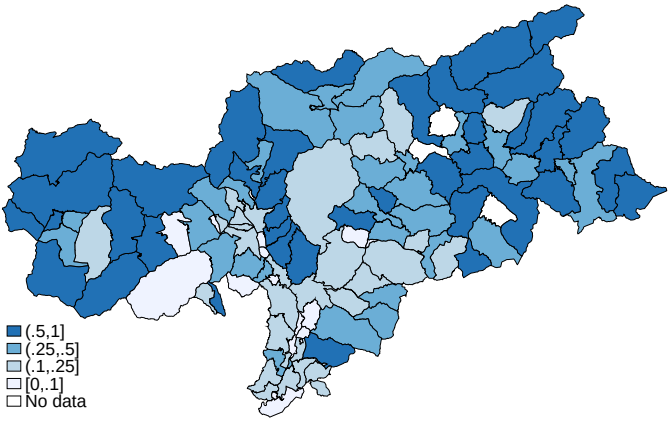


Figure 2: Spatial distribution of public servants among Italians across South Tyrolean municipalities in 1961 (shares).

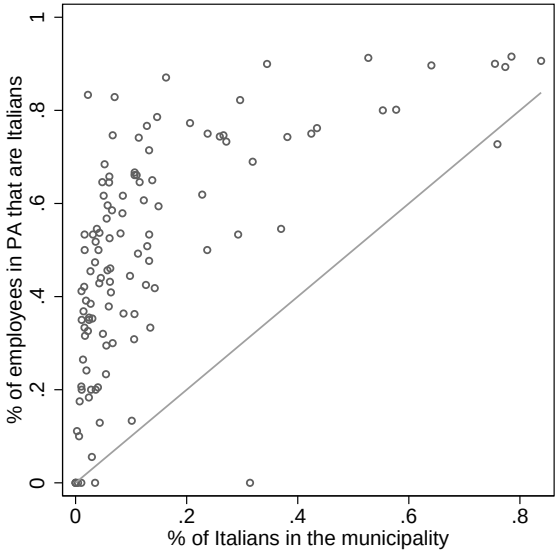


Figure 3: Shares of public servants among Italians and share of Italians in South Tyrolean municipalities in 1961.

Our paper primarily connects with a young literature on labor division and ethnic conflict. Becker et al. (2016b) and Grosfeld et al. (2017) have documented the spark of violence between members of different ethnic groups when historically ethnic divisions in the labor market are subjected to variation at some point in time. Both papers show a rise in pogroms and anti-Jews attitudes in Europe following the Protestant Reformation that induced friction in the money-lending sector (Becker et al. (2016b)) or in periods that combined economic shocks with political uncertainty (Grosfeld et al. (2017)). As we specifically look at the voting behavior of Italians, we also connect to a large literature on Immigration, ethnic diversity, and voting (Barone et al. (2016); Becker et al. (2016a); Colussi et al. (2016); Halla et al. (2017b); Mayda et al. (2016)).

We contribute to it in several ways. First, our analysis shows how conflict and political extremism may break out even if economic resources are relatively abundant—South Tyrol is a rich and developed region and the climax of extremism occurred in a period of relative prosperity.[3] This is at odd with much of the literature that often studies ethnic conflict in poor or developing countries or in historical periods prior to the industrial revolution. Secondly, it documents a shift in political attitudes of a small-scale, geographical sparse minority—the Italian group. This is often empirically challenging and the evidence of political attitudes of ethnic minorities is scarce, despite having frequently been the target of violence. Minorities are, in fact, often unlikely to pour into the streets and protest as they fear to be harshly repressed by the majority. They are unlikely to organize themselves in political movements as they generally have limited political rights guaranteed. Furthermore, due to their small-scale size, they are scarcely represented in the political arena, which prevents the observation of a potential source of political attitudes elicitation. The Italian group, while a minority in South Tyrol, was well represented in the country and could resort to a wide array of political tools to defend their economic privileges. Finally, despite the Italian political

[3] South Tyrol is the richest region among the Italian regions—its gross domestic production per capita has been 43,400 Euro in 2016, about 15,000 percentage points above the Italian mean as well as 2,000 Euro above the Austrian mean.

system was highly polarized between Christian Democrats and Communists, a small post-fascist party, the *Movimento Sociale Italiano* (MSI), had as main goal the defence of the *Italianness*; its vote share can be thus used to measure changes in the anti-German attitudes of Italians in South Tyrol.

Our analysis also shows that terrorist attacks did not change anti-German attitudes of Italians (as, for example, in Montalvo (2011)), but were successful in inducing the Italian government to make concessions to the German group. In this respect, we connect with Gould and Klor (2010) who documented this finding in the Israeli-Palestinian conflict.

The remainder of the paper is organized as follows. In Section 2.2 we describe the major events that occurred in the region starting from the Italianization process that gave rise to a distorted labor market for public servants. Section 2.3 describes the data, while in Section 2.4 we discuss our empirical strategy and present the baseline results. In Section 2.5 we exploit heterogeneity in the Italian settlement. In Section 2.6 we document our main argument using data from the labor market. Section 2.7 tests for alternative mechanisms that might explain our results. Section 2.8 concludes.

2.2 Historical background

The history of South Tyrol is particularly rich of events and discontinuities. Because of its enviable geographical position, Germans, Italians, and French put their eyes on it. The land, in fact, was the door to the most strategic and commercial point over the Alps: the Brenner pass. It was located just 1000 meters above the sea level, thus being considerably lower than the alternative Swiss ones. The snow melted earlier in the Spring and traffic could be resumed much quicker. Romans built upon it a strategic route, the *Via Claudia Augusta*, for both military conquests and the preservation of the *Pax Romana*. In the Middle Age, this position favored its economic expansion as an important commercial region that Italians and Germans exploited to buy and sell artisan products. Po-

litically, the wealth of bishoprics and counties were eventually unified by the local nobility into the unique county of Tyrol that had, in turn, been acquired by the Habsburg dynasty in 1363. Five centuries later, the Austrian-Hungarian empire had also annexed the bishopric of Trent (1805) to Tyrol. This status quo remained unchanged until the end of the WWI and the declaration of the Treaty of Saint-Germain-en-Laye (1919) when South Tyrol and Trentino passed to Italy.

The remainder of this section summarizes the main political events following the annexation of the South Tyrol to Italy. Since we compare the election results in the post World War II period with the period following the introduction of the "Package", we first provide an overview the history of South Tyrol's Italianization that follows its annexation to Italy and the advent of Fascism in the peninsula. We then turn to the post World War II conflict between Austria and Italy and to a detailed description of the "Package" reform and its implications for the labor market. A more detailed and comprehensive history of the South Tyrol is provided in Alcock (1970) and Steininger (2003).

2.2.1 The Italianization of the South Tyrol

As the WWI came to an end, the Habsburg-Hungarian Empire saw its dissolution. Following the adoption of the Woodrow Wilson's self-determination principle, Austria and Hungary were redefined as small landlocked states. The newly established Republic of Austria lost around 60% of the old Austrian Empire's territory, including South Tyrol and Trentino, both promised to Italy in the secret Treaty of London of 1915 as the prize to change side and go to war against Austria and Germany, its former allies.[4]

Despite the annexation of South Tyrol, Trento, and Trieste, resentments spread all over Italy for the unsatisfactory conditions that the coun-

[4] At the outbreak of the WWI, Italy initially maintained a neutral position, despite her alliance with the Central Empires, Germany and Austria. Besides being militarily unprepared to engage in a war, Italy was also profoundly divided over the subject. However, in 1915 the government began negotiations with the Allies claiming the annexation of "*Cisalpine Tyrol, following the geographical and natural frontier (the Brenner) . . .*" (Salandra (1932)). The treaty was signed in London on April 26th, 1915.

try had obtained in the Treaty of Saint-Germain-en-Laye of 1919.[5] Italians had sacrified countless lives during the WWI and there were concerns that awarding too much autonomy to the South Tyrol (and the Germans) might have collided with the Italians' mood, who were conscious of the cost that had been paid for its attainment. All the good resolutions that the Italian government maintained in Saint-Germain-en-laye were thus stopped in the Parliament, where the nazionalists' opposition prevailed. The nationalist wave was well interpreted and taken advantage of by Mussolini and its fascist party (*Partito Nazionale Fascista*). In 1922 Mussolini's squads repeatedly invaded South Tyrol to defend its italianness against the *Pangermanism*. The climax of the dispute was the *March on Bolzano* organized on the 1st of October, when over 700 fascists invaded the city and occupied the City Hall by force. Three weeks later Mussolini was appointed as Prime Minister: the process of Italianization of the South Tyrol had its start.

The Italianization of the region pivoted around 3 pillars: (i) the destruction of Tyrolean collective memories; (ii) the primacy of the Italian language and the ban of German; (iii) the immigration of Italians from neighbouring regions.

(i) The destruction of Tyrolean collective memories. South Tyrolean monuments that embodied strong symbolic power and promoted narratives linked to the region's Germanness were either removed or destroyed. Among others: the Walter von der Vodelweide statue in the main square of Bolzano; the Laurin's Fountain in Bolzano; the monuments of Andreas Hofer and the Empress Elizabeth of Merano; and the monument of the Grand Duke Henry of Gries near Bolzano. The museum of Bozen was undersized and made the headquarters of the Commission for the Language and Culture (see Figure B1). New monuments to celebrate the fascism power and South Tyrol's italian character were erected in Bolzano (the Victory Monument), in Brunick (to the Alpine

[5] Resentments were particularly targeted towards Fiume and Pola, annexed to the newly formed Yugoslavia despite being populated by an Italian majority. In the days that followed the ratification of the Treaty of Saint-Germain-en-Laye, Italian newspapers began referring to it as the "*mutilated victory*."

soldiers) and in other South Tyrolean municipalities. The name itself, South Tyrol, was interdicted and replaced by the Italian *Alto Adige*, while the name of towns, villages, rivers, and mountains were substituted with their Italian equivalent or created *ex-novo* when absent. Even the use of German inscriptions on gravestones was prohibited, with already existent ones often required to be italianized (see Figure B2).

(*ii*) The primacy of the Italian language and the ban of German. The second pillar of the Italianization program was the establishment of Italian as the only official language. This measure had several implications for the labor market. First, German officials that did not know Italian were dismissed, while Italians were appointed as clerks to all municipal councils throughout the area.[6] Examinations to become a public servant, especially a teacher, were severe. As a result, in 1939 more than 95% of all public posts were counted to be in the hands of Italians, despite the group weighted the 25% of the total population. Second, it implied that Italian was the only language to be used in the Courts.[7] Further, Italian gradually replaced German as language of instruction: by 1928-1929, it was the sole language of instruction in all elementary schools. In municipalities were German was by far the majority, supplementary classes taught in the mother language could be arranged if requested by parents, which came at the cost of being labelled as "anti-national." According to the official reports, in 1928-1929 there were 760 (30) classes with Italian (German) being the instruction language. The 30 classes disappeared at the beginning of the year 1929-1930.

(*iii*) The immigration of Italians from neighbouring regions. The encouragement of massive movements (and subsequent settlement) of workers and their families from other Italian regions to (in) South Tyrol was an additional lever which the Fascist regime heavily relied on to successfully implement its Italianization programme. Movements to

[6] A Royal Decree in 1925 stated that, to become a clerk to municipal councils, citizens had to provide a certificate from an Italian secondary school or proof of service carried out in the Italian administration for at least three years. The South Tyroler could have hardly been able to fulfil these requirements.

[7] The only tolerable exception was the case when both parties were Germans.

the region were strongly incentivized by the development of industrial zones and the subsequent creation of numerous job opportunities. While up until the end of the 1920s, the Montecatini aluminium plant in Sinigo, near Merano, was the only example of non-agricultural entity in the region, between 1935 and 1943 many leading companies set up branches in the newly-created industrial zone around Bolzano, including Lancia, Falck, Montecatini INA, Viberti, and SAIM. Such a shift towards the creation of a less-rural but more industrial community was accelerated by the emanation and approval of several facilitation measures. For instance, the Royal Decree of 23 September 1934 No. 1621, which set up the industrial zone around Bolzano, provided (Art. 2) duty-free import of construction materials and machines if the same could not be produced in Italy; (Art.3) a ten-year exemption from income tax on the newly erected concerns; (Art. 4) no raising of income tax on expanding concerns; and (Art. 5) guarantee of state aid (Art. 6) up to 25 million lire in yearly instalments of no more than 5 million lire. Alongside the industrialization process, the Fascist regime initiated a vast programme of public houses construction to support the arrival of the newcomers, and undertook a systematic harsh process of "soil conquest", mainly backed by the Istituto di Credito Fondiario delle Venezie and the Ente di Rinascita Agraria per le Tre Venezie (ERA). Table A1 reports the number of house units classified by ethnic group of the occupants and relative to different time intervals: before 1919, 1919-1945, 1946-1960, and 1961-1970. The number of houses having Italian-speakers as occupants increased markedly after 1919, jumping from 4517 units in the pre-1919 period to 7066 between 1919 and 1945, and rising further to 13313 units between 1961 and 1970. Conversely, the house units occupied by German-speakers dropped by almost 3 quarters in the 1919-1945 period relative to the pre-1919 one.

2.2.2 The post-WWII interlude and the independence of Austria

After the end of the WWII, Austria was split into four parts under control of the Ally forces (France, Soviet Union, United Kingdom, and United States) and suspected of having been a tight collaborationist country of Nazism. In Italy democracy was restored under a constitutional Republic and elections took place under a proportional rule that remained in force until 1992 (the so-called *prima Repubblica*). The political system that emerged was highly polarized. The two biggest parties were the Christian Democrats (*Democrazia Cristiana, DC*), a center party with strong ties with the Catholic Church, and the Communists (*Partito Comunista Italiano, PCI*) that maintained throughout this period strong connections with the Soviet Union hierarchies. On the extreme right, a post-fascist political party (*Movimento Sociale Italiano, MSI*) was founded in 1946. Despite the term "fascism" was forbidden and could not appear anywhere, the MSI party and fascism shared common values[8].

The South Tyrol question was settled down under the supervision of the WWII winners that led to the so-called Gruber-De Gasperi agreement of the 1946[9]. The agreement contained formulas that were to ensure more autonomy to Germans; however, the Italian government took advantage of the Austrian position to give a wide interpretation of the articles there contained. The name of South Tyrol was restored (together with Alto Adige) as well as the names of towns, rivers, mountains that were to be referred in Italian as well as in German. Germans were allowed to attend school classes in which the instruction language was German. Schools continued to have no autonomy and their administration was controlled by the Ministry of Education in Rome. Overall, full equality between the two ethnic groups was far to be attained. Public posts were still an Italian prerogative—90% of the total public servants were Italians, although Germans made up 65% of the total population. The right of using Ger-

[8] On a more detailed description of the post-WWII political system see Fontana et al. (2017).

[9] The agreement, also known as the Treaty of Paris, was signed by Karl Gruber, Austrian Foreign Minister, and Alcide De Gasperi, Italian Prime Minister.

man in relations with officials and organs of the public administration, introduced by the Gruber-De Gasperi agreement, had not been granted in practice since bilingual officials and employees were lacking.

The increasing resentment among Germans due to the unsatisfactory consequences of the Gruber-De Gasperi agreement started to be taken into account when Austria became a *de jure* independent state, with proper representatives in the United Nations and at any international level. Along with diplomacy, the South Tyrolean question gained visibility thanks to a massive terrorist wave that had its start in 1956, a year later Austria regained independence. This long parenthesis of terrorism produced 288 attacks and 19 dead men. According to the official reports, terrorists were South Tyroleans (103), Austrian (40), and German citizens (of the Federal Republic of Germany, 14)[10]. The reply of Rome was harsh and Austria could not enter the European Economic Community because of the Italian veto.

2.2.3 The "Package" reform and its implications for the labor market

The bombing season (from mid-1950s onwards) put pressure on the Italian government and no doubt triggered a change in Italy's South Tyrol policy. With the election of a left-center wing government in 1963, having a view more open toward the rights of minorities, this pressure was conveyed to reach a solution to the South Tyrol question. International negotiations resumed and Italy demanded that Austria revised its criminal code seriously to push up new efforts to combat terror. In exchange Italy proposed an "all-inclusive offer" that, from August 1966, became famous as the "Package". The dispute between Austria and Italy was officially concluded on the 30th of November 1969, when the Italian Prime Minister Aldo Moro and the Austrian Foreign Minister Kurt Waldheim signed the agreement in Copenhagen [11], the word "packages" all of a

[10] See the *Elenco delle sentenze per fatti di terrorismo dal 1956 al 1988*, Procura della Repubblica presso il Tribunale di Bolzano.

[11] In November 22 the reform was approved by the SVP (with 52.8% of vote in favor of it), while the 4th of December the Italian Chamber approved it by 282 votes to 26 (MSI and

sudden became a word to which both Italians and Germans got very familiar with.

The Package was indeed likely to overrule the status-quo transferring power from the Italian minority to the German majority and therefore determining a clear juncture in the South Tyrol history.

While the autonomous Region Trentino-South Tyrol remained, its primary legislative power was transferred to the Autonomous Provinces of Trento and Bolzano with respect to numerous subjects, ranging from agriculture and forestry, hunting and fishing, public welfare and charity to communication and transport of provincial interest, employment exchanges, expropriations, and others. Th two Provinces also obtained secondary legislative power in areas like vocational training, public security, hygiene and healthcare, public water, and further ones. Such reorganization and authority redistribution were meant to convey the fact that, in the Province of Bolzano (and only there), the power had to move from the Italian minority towards the German majority. The latter one, in fact, was to be overrepresented in the Council of the Province. Yet, the reform endowed the Provinces with an unprecedented degree of fiscal autonomy. While under the 1948 Autonomy Statute, South Tyrol relied almost entirely on funding from the State or the Region, from 1969 onwards nine tenth of the tax revenues collected had been set to remain in the Province.

Several measures concerning linguistic minorities were also agreed on. German was recognized as a local official language, with Italian retaining its predominance in case of, for example, a bilingual text or documents of a legislative character. Three autonomous school boards were formed, each competent for administrating the schools of its own linguistic group, with special arrangement established for Ladin schools. Knowledge of both Italian and German was required to all citizens who were employed in the public administration sector; a language examination had also to be sit as a pre-requisite for recruitment, promotion or to obtain transfers to other organizations.

What caught more attention among Italian was, however, the new

Monarchists).

equality principle underlying the awarding of the public posts, which were now set to be reserved to citizens of all language groups and proportionally to their numerosity. Specifically, Point 94 of the reform refers to "application of ethnic proportions in the individual administrations effectively represented in the Province of Bolzano, and, within the administrations, in the individual permanent career posts, on the basis of the existing proportions between the Italian and German linguistic groups in the Province (approximately one-third and two-thirds)" (Alcock (1970)). The principle of proportionality was to entail a complex reshuffle of public posts to the detriment of the Italian minority group who had historically benefited from a privileged position within that activity sector of the labour market. In the remainder of the paper we specifically test whether the announcement of the reshuffle of public posts among linguistic groups triggers anti-German sentiments among the Italian group.

2.3 Data description

To investigate whether middlemen minorities develop political extremist preferences when threatened in their economic privileges by a majority group, we collect a wealth of data from several different sources. Table 1 reports summary statistics of all variables employed in the analysis. Details of both data and relative sources are provided below.

Political preferences: We rely upon the Historical Election Archive, an online database regularly updated and published by the Italian Ministry of Interior, to gather information about the general Elections to the Lower Chamber of Deputies held in 1953, 1958, 1963, 1968 and 1972. For each of these five rounds of voting and for every single municipality within the Trento-Bolzano electoral constituency, we collect data on (1) the number of votes each party or electoral block secured; (2) the number of blank and invalid paper ballots; and (3) the number of eligible and registered voters. We then define our outcome variables as the ratio between total votes of the Italian-speaking population for the Movimento Sociale Italiano (MSI) and number of registered voters. We also construct

Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Panel A — observations: commune × election year					
$MSI\ vote\ share$	7.425	12.83	0	95.52	1527
$I(South\ Tyrol)$	0.362	0.481	0	1	1527
$Population$	2540.3	7355.7	83	105699	1527
$Ethnic\ Concentration\ Index$	0.937	0.124	0.481	1	1527
$Share\ of\ Ladins$	2.163	13.41	0	99.29	1527
$Illiterate\ among\ Italians$	8.828	38.82	0	815	1527
$Univ.\ degrees\ among\ Italians$	19.96	147.0	0	2862	1527
$high-school\ degrees\ among\ Italians$	86.12	539.9	0	9478	1527
$Share\ of\ blank\ ballot\ papers$	0.0485	0.0268	0	0.238	1527
$Share\ of\ abstained$	0.0624	0.0397	0	0.380	1527
$Workforce\ in\ Public\ Administration$	84.40	421.4	0	5479	1512
$Workforce\ in\ Construction$	103.7	239.2	1	3339	1512
$Workforce\ in\ Services$	124.3	526.3	1	8630	1512
$Workforce\ in\ Trade$	160.8	621.5	1	9429	1512
$Workforce\ in\ Transport$	42.79	192.0	0	2959	1512
$Workforce\ in\ Agriculture$	263.2	281.1	2	3275	1512
$Workforce\ in\ Industry$	222.9	785.2	1	11144	1514
Panel B — observations: commune (in South Tyrol)					
$\%Italians$	13.20	18.73	0	81.99	115
$migrations$ 1930s	1441.2	4676.8	0	38622	115
$publ.\ housing$ 1930s	0.154	0.201	0	0.841	114
$railway\ routes$	0.165	0.373	0	1	115
$Share\ publ.\ servants\ Italians$ 1960	0.422	0.286	0	1	112
$Share\ construction\ Italians$ 1960	0.0905	0.0953	0	0.745	112
$Share\ services\ Italians$ 1960	0.0854	0.0998	0	0.643	112
$Share\ trade\ Italians$ 1960	0.0947	0.0892	0	0.667	112
$Share\ transport\ Italians$ 1960	0.0965	0.0938	0	0.475	112
$Share\ agriculture\ Italians$ 1960	0.0749	0.134	0	0.658	112
$Share\ industry\ Italians$ 1960	0.136	0.141	0	1	112
$Share\ Italians\ publ.\ servants$ 1960	0.492	0.246	0	0.915	115
$Eth.\ concentr.\ publ.\ servants$ 1960	0.614	0.143	0.369	1	115
$Occupations\ concentr.\ Italians$ 1960	0.385	0.235	0.157	1	112
$Terroristic\ attacks$	1.878	4.371	0	39	115
$Terroristic\ attacks$ 1961 − 66	1.765	4.113	0	36	115
$Terroristic\ attacks$ 1966	0.278	0.923	0	7	115
$(Population < 20k)$	0.983	0.131	0	1	115
$H/l\ hierarchy\ Germans$	0.201	0.273	-0.250	2.250	115
$H/l\ hierarchy\ Germans/Italians$	1.275	17.17	-10.47	180.8	115

two additional variables that enter the regressions as controls: the share of blank voters and the share of abstained voters.

Linguistic groups: Data on the percentage composition of the three official language groups (Italian, German, and Ladin) by municipality in the province of Bolzano come from the Population Censuses that were carried out -once in ten years- from 1961 to 1981. As for the municipalities in the province of Trento, which make up our control group, we exclude from the final dataset those who correspond, as indicated in the Legislative Decree No. 592 of 16 December 1993 and the Provincial Law No. 4 of 30 August 1999, to the original settlement areas of the three historical linguistic minorities: Ladin, Mòcheno and Cimbrian. We thus drop the Ladin municipalities of the Val di Fassa (Campitello di Fassa, Canazei, Mazzin, Moena, Pozza di Fassa, Soraga e Vigo di Fassa) as well as the three German-speaking municipalities of the Val dei Mòcheni (Fierozzo, Frassilongo and Pal del Fersina), and the Cimbrian municipality of Luserna.

The language analysed up to 1961 was the commonly spoken one, whereas in 1971 and 1981 it was a declaration -made by each member of the resident population- of which language group they belonged to. No information about the language composition of the municipalities was provided in the 1951 Census. We impute missing data for the years 1953, 1958, 1963, 1968 and 1972 using linear interpolation.

Italianization: To address potential endogeneity issues and establish an unbiased causal link between changes in the electoral support of Italians for the MSI party and changes in the share of population belonging to the Italian linguistic group, we assemble three instruments. The first one aims to capture the observed phenomenon of massive immigration from other Italian regions that South Tyrol experienced in the 1930s. Throughout those years, movements of Italian-speaking people were greatly promoted and strongly incentivized by the Fascist regime since regarded as a channel through which the programme of Italianization of South Tyrol and the South Tyrolese had to be carried out. Figure 4 shows how the number of registrations at the Registry Office for change

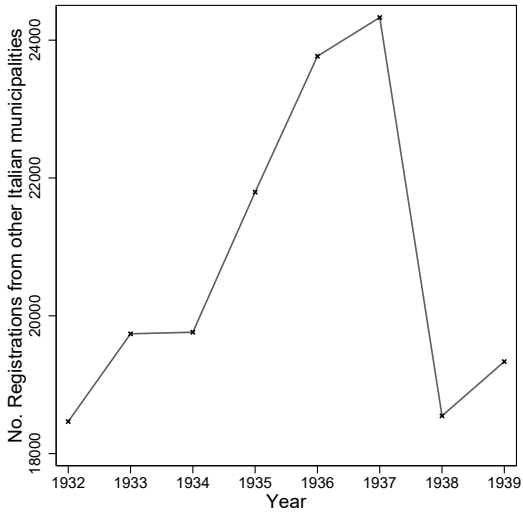


Figure 4: Number of registrations at the Registry Office (Anagrafe) for change of residence from another Italian municipality

of residence from another Italian municipality has been increasing from 1932 onwards.

We make use of this historical evidence to construct an instrument that attempts to isolate exogenous variation in the Italian resident population regressor. We collect municipal-level data for the period 1932-1939 on the number of: (1) persons registered for change of residence from another Italian municipality (registrations from other municipality); (2) persons registered for change of residence from abroad (registrations from abroad); (3) persons cancelled for change of residence to another Italian municipality (cancellations to other municipality); and (4) persons cancelled for change of residence to abroad (cancellations to abroad). Data come from the Provincial Statistics Institute (ASTAT) and cover the period from 1932 to 1939. Using the resulting dataset, we construct the Italianization index, which is defined, for each municipality in the province of Bolzano, as the sum of the annual differences between

registrations from other municipality and registrations from abroad.

Housing units and the Brenner railway: The immigration process of Italian workers and their families to South Tyrol in the 1930s was backed by the implementation of a rigorous programme of public housing construction (see Figure B3 in the Appendix) and was promoted by the creation of an industrial zone around Bolzano. We exploit this additional historical evidence to construct a second instrument defined as the share of housing units occupied between 1919 and 1945 by families who belonged to the Italian linguistic group. Data on the number of occupied housing units that were built between 1919 and 1945 -by language group- are taken from the 1981 Census of Population and Housing. The last instrument comes from observing the route covered by the Salorno-Brenner section of the Brenner railway, a line that was designed under the Austro-Hungarian Empire and constructed at the end of the nineteenth century to connect regions in the North of Italy to Austria. It is defined as a dummy variable that takes on value 1 for the municipalities served by train stations along the route and 0 for those who are not.

Resident population, education and activity sectors: To construct the variables placed on the right-hand side of the estimated regressions, we draw data from a wide array of Population Census volumes covering the period between 1951 and 1981. For all municipalities in the province of Bolzano as well as for those in the province of Trento, we collect data on: (1) the total number of resident population; (2) the resident population by educational level and language group (University degree, upper secondary certificate, lower secondary certificate, primary school certificate, literate but without any qualification, and illiterate); and (3) the resident population by activity sector and language group (agriculture, building, industry, public administration, services, trade, and transport and communications). Table A2 reports total and shares of population and linguistic groups by activity sectors. Most inhabitants of the South Tyrol was employed in agriculture, 90% of which belonged to the German-speaking group, with a smaller percentage working in industry and trade. As for the public administrative sector, it was a prerogative

of the Italian-speaking population: 11148 out of 14789 public posts were covered by Italians.

Terrorist attacks: To capture the incandescent atmosphere South Tyrol and the South Tyrolese experienced between the end of the 1950s and the mid-1970s, we collect from the Historical Archive of the Italian Senate several statistical volumes, all part of the Atti Terrorismo e stragi prodotti dalla Commissione per il filone Alto Adige durante la X legislatura. We exploit the detailed information contained in these volumes on the municipalities in the province of Bolzano where (and the dates when) terrorist attacks occurred to create variables on (1) the total number of terrorist attacks; (2) the dead among civilians; (3) the dead among militaries; (4) the dead among authors of terrorist attacks; (5) the wounded among civilians; and (6) the wounded among militaries. We also come up with a dummy variable taking on value 1 or 0 depending on whether the author of the attack had been identified or not, respectively. Figure B4 in the Appendix provides a picture of the number of attacks executed between 1956 and 1972. Dynamitard attacks on high tension and rail lines, electricity pylons, public buildings and fascist monuments started after Austria became independent on 15 May 1955, reached a pick in 1961 in response to the failure of the negotiations between Italian and Austrian Governments on the application of the Gruber-De Gasperi Agreement, and lowered after the announcement of the "Package" reform in 1966, although still being carried out till the mid-1970s.

2.4 Empirical strategy and results

2.4.1 Baseline estimation

We estimate the effect on political preferences of the fear of losing historically established economic rents by employing a standard difference-in-differences technique. Specifically, we compare the relative change in the vote share of the Italians to the MSI in the post-announcement period of the "Package" relative to the pre-announcement period between municipalities that were likely to be affected (i.e., those in South Tyrol) and those

that were unlikely to be affected by it. As Trentino was 100% populated by Italians the reform', which was to introduce a large amount of autonomy in this Province as well, were unlikely to redistribute established economic rents to members of other ethnic groups. The municipalities of Trentino therefore make an appropriate control group to assess the relative change in the vote share of the Italians to the MSI in those in South Tyrol.

As we explained in Section 2.2.3, the "Package" reform was signed in 1969 and implemented progressively starting from 1974. The interlude between 1966 and 1974 was therefore a period of great uncertainty for the entire population. However, news began to circulate with its announcement in 1966 that prompted fear among the Italian population. We thus take the 1966 as the cut-off year and, in sub-section 2.4.2, we provide a flexible estimation that shows how the definition of this cut-off is consistent with the data.

Our baseline difference-in-differences regression is defined as follows:

$$y_{it} = \beta(treat_i \times post1966_t) + X_{it}\gamma' + \delta_i + \mu_t + \varepsilon_{it}, \tag{2.1}$$

where i indexes municipalities and t indexes election years, which are 1953, 1958, 1963, 1968, and 1972. The unit of observation is municipality times election year. The variable $post1966_t$ is a dummy which takes on value 1 for the elections after the 1966 and 0 before. The variable $treat_i$ is a dummy which takes on value 1 for the municipalities of South Tyrol and 0 for those in the Province of Trent.[12] The outcome of interest, y_{it}, is the number of votes that in the election t Italians cast in each municipality i. The equation also includes municipality and election year fixed effects, δ_i and μ_t, as well as time-variant control at municipal level, X_{it}. Finally, ε_{it} is the idiosyncratic error that we cluster at municipality level.

Columns (1) and (2) in Table 2 display the estimation results of equation 2.1. As expected, the estimated difference-in-differences coefficient is positive and statistically significantly different from zero at whatever level of significance we care to use, and has a value of 4.645 (Column 1). Following the announcement of the "Package" reform the support for

[12] We exclude *** municipalities in the Province of Trent where Ladins are the majority.

the MSI party increased in the South Tyrolean municipalities relative to those in Trentino. The magnitude drops slightly to 4.145 but remains still statistically significant in column (2), where we include a set of controls: the total resident population, the share of Ladins, the group language concentration index, the number of Italians who are illiterate, the number of Italians who hold a high-school diploma and that of Italians who hold a university degree, the number of abstained voters and the number of blank ballot papers.

Table 2: MSI vote share before and after the announcement of the packages — Baseline and flexible estimates

	Dependent variable is: MSI vote share			
	(1)	(2)	(3)	(4)
$I(South\,Tyrol) \times post_{1966}$	4.645***	4.145***		
	(1.355)	(1.545)		
$I(South\,Tyrol) \times 1958$			1.458	1.863
			(1.831)	(1.894)
$I(South\,Tyrol) \times 1963$			-1.234	-1.619
			(1.944)	(2.231)
$I(South\,Tyrol) \times 1968$			3.374	2.317
			(2.135)	(2.320)
$I(South\,Tyrol) \times 1972$			6.057***	6.365**
			(2.178)	(2.727)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Comune FE	Yes	Yes	Yes	Yes
Observations	1628	1527	1628	1527
R^2	0.040	0.042	0.046	0.053

Note: Dependent variable is the vote share of the Movimento Sociale Italiano (MSI). The unit of observation is comune × election year. Columns 2 and 4 include the number of inhabitants, the group language concentration index, the share of Ladins, the number of Italians that are illiterate, the number of Italians that hold a high-school diploma as well as those that hold a University degree. They also control for the number of abstained voters and the number of blank ballot papers. In columns 3 and 4 estimates are relative to the baseline category, year 1953. Standard errors in parentheses are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

2.4.2 Flexible estimation

To test for the existence of a pre-trend in the support for the MSI before the announcement of the "Package" reform and to understand the timing of the shift in the MSI vote share after the announcement, we reformulate the baseline difference-in-differences specification as follows:

$$y_{it} = \sum_{t=1953}^{1972} \beta_t(treat_i \times \mu_t) + X_{it}\gamma' + \delta_i + \mu_t + \varepsilon_{it}. \tag{2.2}$$

where the coefficients β_ts are now allowed to vary over the 5-year time periods and is measured relative to the 1953 baseline category. We present the results of this regression in Columns (3) and (4) of Table 2 and illustrate them graphically in Figure 5.

Relative to 1953, the support for the MSI in South Tyrol does not appear higher in the pre-announcement years 1958 and 1962 and no specific trend arises. The 1958 and 1962 coefficients are not statistically significant, have mixed signs and are not large in magnitude. The results also highlight that the upward shift in the support for the MSI did not take time to develop but took place soon after the reform announcement. No differences in magnitude, sign and significance emerge when control variables are accounted for (Column 4).

2.5 Concentration of economic rents

The way and extent to which the Italian-speaking population spatially distributed across South Tyrolean municipalities (see Figure 1) might have impacted their political preferences. We scrutinize this argument through estimation of the following specification:

$$\begin{aligned} y_{it} &= \beta(treat_i \times post1966_t) + \theta(treat_i \times post1966_t \times share\_ita_{it}) + \\ &+ X_{it}\gamma' + \delta_i + \mu_t + \varepsilon_{it}, \end{aligned} \tag{2.3}$$

where $share\_ita_{it}$ denotes the share of Italians in municipality i at time t. Column (1) in Table 3 reports the estimate of the coefficient on the triple interaction term. The coefficient comes with a negative sign (-0.133) and is statistically different from zero at the 1% level of significance. Consistent with a story of economic rents concentration, our model predicts, following the announcement of the "Package," an increase in the MSI vote share in response to a reduction in the share of Italians. In municipalities with fewer Italians, rents were more concentrated and, the fear

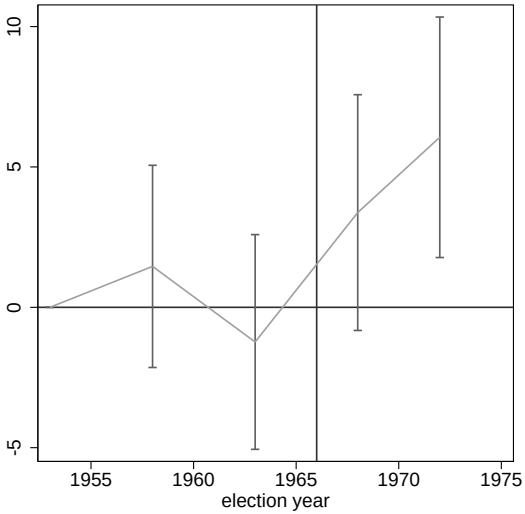


Figure 5: Coefficient estimates and confidential intervals (95%) from regression results displayed in Table 2, column 4.

of losing them was greater. This feeling might have, in turn, affected the voting behaviour of the minority group electorate after the announcement of a reform that aimed at transferring further rights and power to the majority. The interaction coefficient increases only slightly when controls enter the right-hand side of Equation (2.3).

2.5.1 Instrumental variable approach: the Italianization of the South Tyrol

The settlement of the Italian-speaking population in South Tyrol might have, however, been driven by the political structure of the municipalities. Bracco et al. (2017), for instance, has shown that the appointment of a right-wing party major in municipalities of Northern Italy reduces the likelihood of immigrants to move on in them. Their findings suggest that our estimates documented in Columns 1 and 2 of Table 3 could be biased and would not allow a causal interpretation of the results. On top of that, they are also likely to capture a lower bound of the total effect of the "Package" on anti-German attitudes of Italians. It could indeed be that Italians less sensitive to the ethnic conflict might have consciously chosen to move to the smallest Tyrolean villages to cover public posts and therefore their reaction to the "Package" could be arguably lower.

To isolate exogenous variation in the settlement choice of Italians, we estimate by two stage least squares (2SLS) three just-identified separate models,[13] one for each employed instrument. First-stage results are reported in Columns (3), (5) and (7) of Table 3. All the instruments appear to satisfy the relevance condition since their correlation with the endogenous regressor, once the other explanatory variables are netted out, is statistically different from zero. Second-stage results are displayed in Columns(4), (6) and (8) of the same Table and corroborate the presence of a negative sign governing the relationship between share of Italians settled in South Tyrolean municipalities and political support for the MSI party. For instance, when instrumenting for the Italian share of the

[13] A unique over-identified model is also estimated as robustness check. Results, reported in Table A3 in the Appendix, do not move away from those obtained with just-identified separate models.

Table 3: The Italianization channel — 2SLS estimates

	Dependent variable is: MSI vote share							
	OLS estimates		2SLS estimates					
			second stage	first stage	second stage	first stage	second stage	first stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$I(South\,Tyrol) \times post_{1966}$	6.234***	6.117***	7.008***	11.989***	7.243***	2.476***	7.186***	9.050***
	(1.836)	(2.289)	(2.437)	(1.994)	(2.432)	(0.806)	(2.479)	(1.237)
$I(South\,Tyrol) \times post_{1966} \times \%Italians$	-0.133***	-0.145**	-0.215**		-0.221***		-0.223**	
	(0.046)	(0.060)	(0.081)		(0.082)		(0.101)	
$I(South\,Tyrol) \times post_{1966} \times migrations\,1930s$				0.00155***				
				(0.000219)				
$I(South\,Tyrol) \times post_{1966} \times publ.\,housing\,1930s$						70.132***		
						(5.522)		
$I(South\,Tyrol) \times post_{1966} \times railway\,routes$								25.507***
								(4.745)
Kleinbergen-Paap F statistics				49.961		161.406		28.916
Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comune FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1628	1527	1525	1525	1525	1525	1525	1525
R^2	0.048	0.049	0.048	0.542	0.048	0.857	0.047	0.673

Note. Dependent variable is the vote share of the Movimento Sociale Italiano (MSI). The unit of observation is comune × election year. Columns 2 to 8 include the number of inhabitants, the group language concentration index, the share of Ladins, the number of Italians that are illiterate, the number of Italians that hold a high-school diploma as well as those that hold a University degree. They also control for the number of abstained voters and the number of blank ballot papers. Standard errors in parentheses are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

population with migration inflows from neighbouring Italian regions in the 1930s, we estimate that a municipality with one standard deviation above the mean in the share of Italians experienced a 0.31 standard deviations drop in the MSI vote share. Coefficient estimates remain almost unchanged when the number of housing units built in the 1919-1945 period or an indicator of the municipalities served by stations along the Brenner railway route are used as instruments.

2.6 Additional evidence from the labor market

The declaration of Italian as the only language in the public offices by a Prefectural Decree of 28 October 1923 and subsequent laws had caused dismissal of numerous South Tyrolese German-speaking officials from their posts and strongly incentivized immigration of Italian officials from other regions. By 1939 more than 95% of all public posts were in the hands of Italians, although German speaker accounted for 75% of the population. The announcement of the "Package" in 1966 reshuffled the status-quo and brought the fractionalized structure of the labour market back to question: public posts were no longer a prerogative of the Italian-speaking population, but reserved to members of all language groups in proportion to their numerosity. The reform might have instilled fear to lose economic privileges in Italians, thereby influencing their political preferences. To investigate this channel, we estimate the following equation:

$$\begin{aligned} y_{it} = \beta(treat_i \times post1966_t) + \theta(treat_i \times post1966_t \times \\ \times share\_pubamm\_ita_{it}) + X_{it}\gamma' + \delta_i + \mu_t + \varepsilon_{it}, \end{aligned} \tag{2.4}$$

where $share\_pubamm\_ita_{it}$ denotes the share of public servants among Italians. Results are reported in Table 4. Column (1) differ from (2) only for the absence of control variables. After the "Package" reform was announced, we find that a standard deviation rise in the share of public servants among Italians increases the vote share of the MSI party by 3.72%.

To exclude channels, other than the public administration one, from being at play, we investigate different model specifications. First, we add triple interaction terms to control for the share of employees among Italians in alternative occupations (construction, services, trade, transport, agriculture, or industry). Results are displayed in Columns 3 to 8 of Table 4. The coefficient on the triple interaction that includes the share of public servants among Italians remains always statistically significantly different from zero. For instance, when accounting for the share of employees in agriculture among Italians, we estimate that, after the announcement of the "Package" reform, a one standard deviation growth in the share of public servants among Italians boosts the support for the MSI party in South Tyrolean municipalities relative to those in Trentino by roughly 3.3 %. In Column (9), we combine all triple interaction terms and leave out the one that captures the share of employees in the industry sector among Italians, which is used as baseline category. Again, the coefficient estimates of the interactions that are not related to the public administration sector are all statistically indistinguishable from zero. We complement this initial robustness exercise by means of further measures of ethnolinguistic concentration in the labour market: the share of Italians among public servants; the ethnic concentration index in the public administration; and the job concentration index in the Italian group. Each of these is interacted with a dummy that captures the observations in the treatment group and a post-treatment dummy. Results, shown in Table 5, confirm that, following the reform announcement in 1966, municipalities where Italians specialized the most as public servants were more supportive of the MSI party. The coefficient on the share of employees in the public administration among Italians remains highly statistically significant and exhibit an even increasing size when concentration measures are accounted for, as witnessed by figures in Column (8) of Table 5.

Table 4: Specialization of Italians in the public amministration vs. other occupations

	Dependent variable is: MSI vote share								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I(South\,Tyrol) \times post_{1966}$	-1.099	-1.607	-2.895	-2.659	-2.570	-1.859	-0.643	-0.369	-6.820
	(2.057)	(2.038)	(2.520)	(2.495)	(2.915)	(2.478)	(2.961)	(3.626)	(7.242)
$I(South\,Tyrol) \times post_{1966} \times \%\, publ.\, servants\, Italians$	13.509**	13.307**	14.458**	14.267**	14.164**	13.346**	11.783*	11.950*	17.740**
	(6.070)	(6.157)	(6.225)	(6.184)	(6.528)	(6.029)	(6.883)	(7.039)	(8.732)
$I(South\,Tyrol) \times post_{1966} \times \%\, construction\, Italians$			8.710						10.627
			(14.463)						(14.282)
$I(South\,Tyrol) \times post_{1966} \times \%\, services\, Italians$				7.931					9.816
				(13.149)					(15.787)
$I(South\,Tyrol) \times post_{1966} \times \%\, trade\, Italians$					5.689				13.134
					(15.346)				(18.044)
$I(South\,Tyrol) \times post_{1966} \times \%\, transport\, Italians$						1.968			3.330
						(16.031)			(19.121)
$I(South\,Tyrol) \times post_{1966} \times \%\, agriculture\, Italians$							-7.144		-2.226
							(8.410)		(11.715)
$I(South\,Tyrol) \times post_{1966} \times \%\, industry\, Italians$								-4.927	
								(9.809)	
Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comune FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1614	1514	1514	1512	1514	1514	1514	1514	1512
R^2	0.062	0.063	0.064	0.063	0.064	0.063	0.066	0.063	0.068

Note. Dependent variable is the vote share of the Movimento Sociale Italiano (MSI). The unit of observation is commune × election year. Columns 2 to 8 include the number of inhabitants, the group language concentration index, the share of Ladins, the number of Italians that are illiterate, the number of Italians that hold a high-school diploma as well as those that hold a University degree. They also control for the number of abstained voters and the number of blank ballot papers. Every column controls for the number of employees in the considered occupation. In column 8 estimates are relative to the baseline category, share of employees in the industry sectors among Italians. Standard errors in parentheses are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Specialization of Italians in the public amministration — other measures of labour concentration

	Dependent variable is: MSI vote share							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$I(South\,Tyrol) \times post_{1966}$	-1.607	6.282*	1.421	-3.546	-18.452***	-0.594	-0.747	-17.573**
	(2.038)	(3.484)	(3.579)	(6.034)	(6.081)	(3.138)	(3.152)	(7.026)
$I(South\,Tyrol) \times post_{1966} \times \%\,publ.\,servants\,Italians$	13.307**		13.935**		16.456***		17.503***	35.170***
	(6.157)		(6.245)		(6.064)		(5.127)	(9.072)
$I(South\,Tyrol) \times post_{1966} \times \%Italians\,publ.\,servants$		-4.471	-6.632					-9.957
		(5.385)	(5.663)					(6.049)
$I(South\,Tyrol) \times post_{1966} \times eth.\,concentr.\,publ.\,servants$				12.146	25.010***			35.454***
				(9.063)	(9.039)			(12.412)
$I(South\,Tyrol) \times post_{1966} \times occupations\,concentr.\,Italians$						11.236	-6.395	-25.077*
						(9.070)	(10.534)	(14.351)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comune FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1514	1527	1514	1527	1514	1514	1514	1514
R^2	0.063	0.043	0.066	0.046	0.075	0.051	0.064	0.090

Note. Dependent variable is the vote share of the Movimento Sociale Italiano (MSI). The unit of observation is commune × election year. Columns 2, 3, and 5 include the number of inhabitants, the group language concentration index, the share of Ladins, the number of Italians that are illiterate, the number of Italians that hold a high-school diploma as well as those that hold a University degree. They also control for the number of abstained voters and the number of blank ballot papers. Every column controls for the number of employees in the public amministration. Standard errors in parentheses are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

2.7 Potential alternative mechanisms

The evidence of an increase in the MSI voting share after the 1966 announcement of the "Package" reform in South Tyrolean relative to Trentino municipalities might potentially be founded on alternative grounds and interpreted from different angles. The fear of being deprived of historically-established economic rents that pervaded Italians from 1966 onwards might have not been the only mechanism at work. In this section, we test whether being exposed to a more intense terrorist wave has made anti-German sentiments more salient. We also test the effect of relative income and additional mechanisms based on population.

2.7.1 Terrorist attacks

The dynamitard activities carried out from mid-1950s onwards to draw attention of the international press on the South Tyrol question might provide a first possible explanation to the move of Italians voting preferences towards an extremist political party. After Austria became independent on 15 May 1955, a renewed harsh interest in examining the complaints and fulfil the wishes of the South Tyrolese emerged (Alcock (1970)). Complaints were mainly related to the Italian Governments non-observance of some clauses of the Gruber-De Gasperi Agreement, particularly: (i) the exercise of autonomous legislative and executive regional power granted to the German-speaking inhabitants of the Province of Bolzano; and (ii) the safeguarding of the ethnical character and the cultural and economic development of the German-speaking group.[14]

The resulting diplomatic battle that started with the Italian Aide-Mémoire of July 1956 and continued with the Austrian Memorandum of Oc-

[14] The principle of assuring ethnic proportions in public offices had been disregarded in toto. As Alcock (1970) reports, 93.5% of the posts in the State Administration of the Bolzano Departmental Directorate of the State Railways was occupied by Italians; the percentage was equal to 78.9% in the Postal Administration, 97.7% in the Labour Exchange, Labour Control Board, and the Social Security Administration, 99.2% in the Prefecture of Police, 87.1% in the Judiciary, 98.6% in the Department of Public Finance. Moreover, 16 out of 28 posts in the Bolzano Chamber of Commerce were held by Italians, 9 out of 12 in the Regional Credit Bureau, 13 out of 17 in the Provincial Commission of the Labour Exchange, and 90 out of 97 in the Provincial Health Insurance Administration.

tober 1956, the Italian reply of February 1957, the 1960 debate over South Tyrol question at the United Nations, and subsequent nine years of Austro-Italian consultations, created a rather tense atmosphere and served to arouse public opinion. From the autumn of 1956 onwards, numerous dynamitard attacks on high tension and rail lines, electricity pylons, public buildings and fascist monuments were executed in the province of Bolzano, particularly in the municipalities of Bolzano, Campo Tures, Appiano sulla Strade del Vino, Termeno sulla Strada del Vino, Brunico and Merano (see Figure B5 in the Appendix), causing dead and wounded among militaries and civilians. Our results could be picking up the effects of these attacks. We geolocalize each terrorist attack and match such information with municipal spatial boundary to assign attacks to communes as in Figure B5. As we explained in Section 2.3 we construct three variables: (i) the total number of attacks that occurred in each municipality of the Province of Bolzano between 1956 and 1972, (ii) the number of attacks over the 1961-1966 period, and (iii) the number of attacks in 1966. We therefore reformulate our model specification by multiplying the dummy that identifies observations in the treatment group and the post-treatment dummy with the each of the above three variables.

Results are reported in Table 6. Regardless of the period which terrorist attacks refer to and of whether additional control variables are accounted for or not, all the estimated coefficients reveal a substantial increase in the voting share of the MSI party after the announcement of the "Package" reform. Results reported in Columns (3), (6), and (9) also reveal that the triple interaction term between the dummy for the treated group, the post-treatment temporal dummy, and the share of public servants among Italians remains statistically significantly different from zero and preserves its positive sign and size even when terrorist attacks are accounted for.

2.7.2 Relative income

Changes in the relative income of ethnic groups due to income shocks might have also driven our results. Exploring the origins of Hindu-

Table 6: Terrorist attacks and specialization of Italians in the public amministration

	Dependent variable is: MSI vote share								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I(South\,Tyrol) \times post_{1966}$	5.048***	4.486***	-1.235	5.025***	4.452***	-1.259	4.826***	4.230***	-1.596
	(1.425)	(1.584)	(2.166)	(1.417)	(1.573)	(2.151)	(1.385)	(1.536)	(2.028)
$I(South\,Tyrol) \times post_{1966} \times terrorist\,attacks$	-0.211	-0.239	-0.220						
	(0.146)	(0.269)	(0.270)						
$I(South\,Tyrol) \times post_{1966} \times terrorist\,attacks\,1961-66$				-0.211	-0.228	-0.230			
				(0.164)	(0.291)	(0.291)			
$I(South\,Tyrol) \times post_{1966} \times terrorist\,attacks\,1966$							-0.641	-0.510	-1.317
							(0.853)	(1.223)	(1.158)
$I(South\,Tyrol) \times post_{1966} \times \%\,publ.\,servants\,Italians$			13.257**			13.303**			13.874**
			(6.133)			(6.117)			(6.018)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comune FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1628	1527	1514	1628	1527	1514	1628	1527	1514
R^2	0.041	0.043	0.063	0.041	0.042	0.063	0.040	0.042	0.064

Note. Dependent variable is the vote share of the Movimento Sociale Italiano (MSI). The unit of observation is commune × election year. Columns 2, 3, and 5 include the number of inhabitants, the group language concentration index, the share of Ladins, the number of Italians that are illiterate, the number of Italians that hold a high-school diploma as well as those that hold a University degree. They also control for the number of abstained voters and the number of blank ballot papers. Standard errors in parentheses are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Muslim violence in post-Independence India, Mitra and Ray (2014) find that an increase in per capita Muslim expenditures leads to a significant increase in short to medium run conflicts. Ethnic and religious violence might thus be brought about by changes in relative incomes of two competing ethnic groups.

Since data on income of Italian- and German-speaking groups are not available, we gather information from the 1961 and 1971 Censuses on the resident population by occupational categories along vertical hierarchy and assemble two proxy variables: the difference between 1971 and 1961 in the ratio of German managers and businesspeople to German employees; and the difference between the same two years in the ratio of German managers and businesspeople to German employees divided by the ratio of Italian managers and businesspeople to Italian employees. Both variables are higher when the economic situations of Germans increased during the ten-year period across the announcement of the packages. The second measure also tells us how much the economic situations of Germans increased relative to that of Italians.

Results obtained by employing these two variables are displayed in Table 7. Our main argument that, pushed by the fear of losing their established economic privileges, Italians' political preferences after the 1966 reform announcement developed towards a more extremist direction in municipalities where they had specialized in the public administration sector, is strongly corroborated by the results. The coefficients on the triple interactions that incorporate the income proxies are both statistically not significant, whereas the coefficients on the interactions that capture the effect of the share of public servants among Italians are both statistically different from zero at the 5% level of significance and come with the expected signs.

2.8 Conclusions

In this paper we exploit a unique experiment of history that occurred in the 1960s in South Tyrol to investigate how and to what extent frictions in the labor market prompt salience in the ethnic conflict and in-

duce a move in ethnic minorities voting preferences towards more extremist political platforms. During the fascist epoch, South Tyrol experienced a complex process of Italianization that produced persistent distortions in the public administration sector of the labor market in favor of the Italian-speaking minority group. This well-rooted ethnic division of labour was, however, brought back to question by the 1966 announcement of the Package reform that aimed, among others, at awarding public posts to citizens of all language groups and proportionally to their numerosity.

Drawing upon a wealth of data on Italians voting preferences, composition of the population by linguistic group, and detailed information on occupations in the labour market, we find that, following the reform announcement, the vote share of the post-fascist party increased markedly in South Tyrolean municipalities relative to those in the province of Trento. The increase was higher in those municipalities where Italians had specialised the most as public servants: a municipality with a one standard deviation above the mean in the share of public servants among Italians is estimated to experience a 3.72% increase in the MSI vote share. These results bring evidence of an extremist move in the political preferences of the Italian minority group induced by the fear of being deprived of their historically established economic privileges.

Table 7: Relative income and specialization of Italians in the public amministration

	Dependent variable is: MSI vote share			
	(1)	(2)	(3)	(4)
$I(South\,Tyrol) \times post_{1966}$	4.017*	-1.530	4.131***	-1.623
	(2.056)	(2.146)	(1.555)	(2.079)
$I(South\,Tyrol) \times post_{1966} \times h/l\,hierarchy\,Germans$	0.602	-0.223		
	(4.974)	(4.638)		
$I(South\,Tyrol) \times post_{1966} \times h/l\,hierarchy\,Germans/Italians$			0.014	-0.018
			(0.022)	(0.030)
$I(South\,Tyrol) \times post_{1966} \times \%\,publ.\,servants\,Italians$		13.301**		13.450**
		(6.231)		(6.354)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Comune FE	Yes	Yes	Yes	Yes
Observations	1526	1513	1526	1513
R^2	0.042	0.063	0.042	0.063

Note. Dependent variable is the vote share of the Movimento Sociale Italiano (MSI). The unit of observation is commune $\times$ election year. Columns 2, 3, and 5 include the number of inhabitants, the group language concentration index, the share of Ladins, the number of Italians that are illiterate, the number of Italians that hold a high-school diploma as well as those that hold a University degree. They also control for the number of abstained voters and the number of blank ballot papers. Standard errors in parentheses are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Population below 20,000 and specialization of Italians in the public amministration

	Dependent variable is: MSI vote share			
	(1)	(2)	(3)	(4)
$I(South\,Tyrol) \times post_{1966}$	-1.362	5.939	-4.545***	-2.416
	(1.192)	(3.772)	(1.607)	(4.308)
$I(South\,Tyrol) \times post_{1966} \times (pop < 20k)$	5.571***	0.176	3.039**	1.823
	(1.531)	(1.890)	(1.498)	(1.698)
$I(South\,Tyrol) \times post_{1966} \times \%Italians$		-0.145**		-0.038
		(0.063)		(0.062)
$I(South\,Tyrol) \times post_{1966} \times \%\,publ.\,servants\,Italians$			13.215**	12.275*
			(6.171)	(6.697)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Comune FE	Yes	Yes	Yes	Yes
Observations	1527	1527	1514	1514
R^2	0.042	0.049	0.063	0.063

Note. Dependent variable is the vote share of the Movimento Sociale Italiano (MSI). The unit of observation is commune $\times$ election year. Columns 2, 3, and 5 include the number of inhabitants, the group language concentration index, the share of Ladins, the number of Italians that are illiterate, the number of Italians that hold a high-school diploma as well as those that hold a University degree. They also control for the number of abstained voters and the number of blank ballot papers. Standard errors in parentheses are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Chapter 3

The Geography of Anti-Immigrant Attitudes across Europe, 2002-2014

3.1 Introduction

Immigrants are making up a continuously growing proportion of the European population. In 2014, circa 1.9 million people moved to the EU-28 from non-member State countries, while another 1.8 million migrated to and from another EU Member State. By January 2015, 19.8 million citizens of non-member countries and 34.3 million people born outside of the EU were living in the EU-28 (Eurostat 2016).

Meanwhile, radical right-wing populist parties - with anti-immigration actions at the core of their political agendas - have increased and broadened electoral support across Europe. For instance, in the 2014 general election, the *Sverigedemokraterna* became Sweden's third biggest party, securing almost 13 percent of the vote; the *Dansk Folkeparti* in Denmark won 21.1 percent of the vote in 2015, almost doubling its support since the previous 2011 general election and, in 2015, the *Schweizerische Volkspartei* obtained a record 29.4 percent of the vote in Switzerland. As of December 2016, the *Alternative for Germany* (AFD) party has gained repre-

sentation in ten of the 16 German Federal state parliaments and won 7.1 percent of the votes in the European Parliament elections in 2014. In the same election, The *United Kingdom Independence Party* (UKIP) became the strongest British party winning 26.6 percent of votes. More recently, in the presidential election in Austria, the candidate of the *Freedom Party Austria* (FP), Norbert Hofer, won 48 percent of votes, or in October 2017, the same party winning 51 seats (out of 183) in the Austrian parliament. As a consequence of this political shift across Europe, partly reinforced by the portrayal of the so-called European refugee crisis, some European governments have started tightening some of their immigration policies, even in traditionally more open and liberal countries such as Sweden where, on 21 June 2016, the Swedish Parliament adopted legislative changes that introduce a temporary three-year (13-month) residence permit for those granted refugee (subsidiary protection) status and limit remarkably the possibilities of asylum seekers to be reunited with their families. This political backlash seems - at least partly - to be driven by growing perceptions and beliefs that continuing immigrant flows establish a threat to the economic, cultural, and social status quo and future prospects. The Spring 2016 Eurobarometer reports that almost half of Europeans (48 percent) mention immigration as the issue of greatest concern, well ahead of terrorism and the economy. Although there is no unified theory for public attitudes and opinion on immigration (Chandler (2001); Price (1995)), the literature presents a number of factors potentially driving anti-immigrant sentiments (Rustenbach (2010)). Economic theories for instance, explain opposition to incoming migrants to be shaped by fears about labour market competition (Mayda (2006); Scheve (2001)) and a growing fiscal burden on public services (Boeri (2005); Facchini (2009); Hanson (2007)) Natives are more likely to oppose immigrants with similar skills and support inflows of those with skill endowments that complement their own (Mayda (2006); Scheve (2001)). Moreover, when governments adjust tax rates to balance their budgets, or alternatively, adjust per capita welfare benefits while trying to keep tax rates constant, high-income earners are economically more negatively (positively) affected by inflows of unskilled immigrants

than low-income earners and, therefore, are expected to be more opposed to (in favour of) low-skilled immigrant inflows (Facchini (2009)). Non-economic explanations emphasize socio-cultural factors, mainly reflecting nativist mind-sets and a high degree of national identification with a strong desire for ethnically homogeneous societies. Hostility to newcomers has been associated with, for instance, an isolationist mentality, pessimistic evaluations of the current and future state of the economy, and feelings of alienation from mainstream social and political institutions (Espenshade (1996)); racial or cultural prejudice (Dustmann (2007); Gang (2002)); beliefs about the size of the immigrant population, cultural and national identities, and a general disposition to trust in other people (Sides (2007)); threats to in-group resources and threats to the shared customs and traditions of the society (McLaren (2007)); perceived cultural threats especially with regard to the English language (Chandler (2001)); or stereotypical beliefs about the work ethic and intelligence of other groups (Burns (2000)). This study builds on these rather amorphous explanations and contributes a new conceptual angle and empirical perspective on the formation and dissemination of anti-immigrant attitudes. Like other studies before, we hereby identify significant heterogeneity in immigration attitudes across space and time. Immigration attitudes vary significantly across European regions (Markaki (2013); Rustenbach (2010); Schlueter (2008)), which still exist even after controlling for socioeconomic differences (Raijman (2003)). These spatial patterns, however, seem to change over time, and the present study argues that anti-immigration sentiments are part of a spatial-dynamic diffusion and clustering process by which otherwise similar people living in different European regions tend to vary greatly in their attitudes. Our empirical investigation builds on the propositions of dynamic social impact theory (Latané (1981, 1996)), and finds robust evidence for a prevalent spatial dependence of anti-immigration attitudes across 30 European countries and respective sub-national regions. This explains the existence of multiple regional clusters with relatively similar anti-immigrant attitudes within and differences across those clusters even when controlling for other economic and non-economic factors. We argue that when people

form their opinions about immigration and immigrants they are strongly influenced by the (anti-)immigrant attitudes of people living in the same or nearby location. This implies - in terms of Tobler's first law of geography (see e.g. Anselin (1988)) - that (average) immigrant attitudes of people living in a European region are more influenced by attitudes in nearby regions than those in more distant ones - even if nearby regions are on different sides of country borders.

3.2 Spatial dependence in anti-immigrant attitudes

This study adds, in our view, an important and possibly decisive factor to better understand the evolution and diffusion of anti-immigrant attitudes across time and space, namely the social impact of (groups of) people on the way other (groups of) people may feel and think about an issue such as immigration. Social and spatial proximity (or, distance) between subjects is hereby assumed to be an important factor in explaining similarity (or, dissimilarity) in people's attitudes. Socio-spatial distance between subjects is often ignored in the conceptualisation of social processes of interaction and influence. A notable exception is Latané's theory of dynamic social impact (Latané (1981, 1996)) which emphasizes the importance of distance ('immediacy') as a major determinant of social influence [1]. The impact of other people on a target person or group of persons is proposed to be a function of three factors: the number of others who make up the source, their immediacy or proximity, and the strength or salience of their 'information'. Further, it is assumed that, although people influence each other in a variety of ways through psychological processes of social interaction, all operate through socio-spatial dimensions of proximity and similarity (Latané (1996)).

These propositions applied to the process of anti-immigrant sentiments spreading across space and time imply that anti-immigrant at-

[1] Social influence can hereby be understood as a change in people's thoughts, feelings, attitudes, and ultimately, behaviours resulting from interaction with other individuals or groups.

titudes A' of a 'target' population are influenced in a (multiplicative) function as by the strength of the 'source' population's anti-immigrant sentiment A, the (inverse) spatial distance D between source and target populations and the size of the influencing source population, P:

$$A' = f(A, D, P) \tag{3.1}$$

Impediments to the operation of any of the three factors may, however, attenuate social impact (Latané (1996)). Individuals are influenced by the majority, i.e. when a large portion of an individual's or a group's reference population holds a particular attitude, it is likely that this individual or group of individuals will adopt it as well. This non-deterministic process is able to describe and predict the diffusion of all sorts of beliefs and attitudes through social systems (Latané (1996)). It is based on the assumption that social structure is the result of individuals influencing each other in a dynamic and iterative way, and people are assumed to be more influenced by other people living nearby rather than those farther away. This continuous process of mutual influence eventually leads to local clusters and regional patterns of otherwise 'randomly' distributed attitudes and beliefs.

As a result of the non-random spatial distribution of anti-immigrant attitudes we may identify *spatial dependence* [2] of attitudes which corresponds to the importance of spatial proximity in shaping the degree of social influence experienced by a target population. Spatial dependence of anti-immigrant attitudes finds support in a fundamental tendency of people's attitudes on immigration to become spatially clustered.

Our empirical strategy is to identify spatial dependence in anti- im-

[2]Spatial dependence and its patterns have been studied across a variety of areas (see in Plümper (2010) for an overview) such as military spending and armed conflict (Salehyan (2006); Shin (1999)), asylum migration (Barthel (2015)), terrorism (Bove (2016); Neumayer (2016)), democratization (Gleditsch (2006)), diffusion of environmental technologies and standards (Perkins (2008, 2009)), monetary policies (Plümper (2008); Simmons (2004)), tax and fiscal policies (Basinger (2004); Hays (2003, 2009); Plümper (2009); Swank (2006)), trade and investment policies (Elkins (2006); Mansfield (2003)), social policies (Bailey (2004); Brooks (2007); Franzese Jr (2006); Jahn (2006); Tam Cho (2003)). Most of these studies find supportive evidence for the existence of spatial dependence, obviously to different levels and extent.

migration attitudes by testing the following hypotheses:

Hypothesis 1: Differences in (average) anti-immigration attitudes in European regions are proportional to the distance between regions.

Hypothesis 2: (Average) anti-immigrant attitudes of more populated regions have a stronger effect on (average) attitudes in nearby European regions than on more distant regions

Hypothesis 3: Anti-immigration attitudes across European regions are spatially dependent, i.e. more proximate regions have more similar (average) attitudes, leading to spatial clustering.

3.3 Empirical analysis

3.3.1 Empirical model

The empirical investigation of the spatially dependent diffusion and clustering process of anti-immigration attitudes is performed through estimation of the following spatial lag model specification, based on Plümper (2010):

$$a_{ik} = \rho \sum_{k} w_{ikt} a_{kt} + \beta X_{it} + \gamma_i + \lambda_t + \epsilon_{it} \tag{3.2}$$

where a_{ik} is the value of our dependent variable, i.e. the share of ESS respondents in region i who expressed hostility towards immigrants at time t, w_{ikt} a_{kt} is the spatially lagged dependent variable, X_{it} is a vector of control variables, and ϵ_{it} is an identically and independently distributed (i.i.d.) error process. We also include region-specific fixed effects (γ_i) and period fixed effects (λ_t) to account for unobserved spatial heterogeneity (or spatial clustering) and to control for common shocks and time trends.

The spatially lagged attitudinal variable is a composite variable that combines the three components of a spatially dependent social impact function a la Latané (1996). It is constituted by the multiplication of a block-diagonal row-standardized spatial weighting matrix w_{ikt} and

a matrix of the period-specific average of anti-immigrant attitudes in other regions k, a_{kt}.[3] The degree of connectivity between pairs of regions i and k over the seven periods of scrutiny is measured by employing the inverse of the (geographical) distance d_{ik} between regions i and k, multiplied by k's population size. That is, other regions k are not weighed equally but proportionally to both their respective population size and their respective (inverse) geographical distance to region i. This interaction captures the dimensions 'immediacy' and 'strength' of anti-immigrant attitudes in other regions relative to attitudes in region i. As a result, spatial dependence is identified if the weighted average in immigrant attitudes across all other regions k affect average immigrant attitudes in region $i \neq k$.

3.3.2 Data: Anti-immigrant attitudes across European regions

We have used individual-level data from all seven rounds (2002-2014) of the European Social Survey (ESS) and created from these repeated cross-sectional survey data a panel dataset with the units of observation being sub-national regions (rather than individuals). The ESS is an academically informed cross-national survey that has been conducted since 2002 (at 2-year intervals) across a varying number of EU and non-EU countries. It consists of answers to an hour-long questionnaire on a variety of themes, ranging from subjective well-being to politics and migration. Demographic, socio-economic, political, and attitudinal variables have been generated by aggregating individual-level data at the NUTS2 regional level - based on the 2010 Nomenclature of Units for Territorial Statistics (NUTS) classification scheme - through computation of

[3]For example, if the dependent variable refers to average anti-immigrant attitudes in region AT11 in year 2004, its spatially lagged equivalent will be the sum of the product between the connectivity variable (inverse distance between AT11 and all other regions, respectively, weighted by each respective region's population size in 2004) and attitudinal variable in all other regions, one at a time, in 2004. This procedure is repeated for all regions and all periods in the dataset.

weighted percentages [4]. The aggregation has accounted for changes in the NUTS classification, such as boundary shifts, mergers and/or splits, which are proposed by the European Commission at intervals of at least three years.

As our measure capturing anti-immigrant sentiments, we have used respondents' answers to three questions that are included in the ESS module 'politics' and have been consistently asked in each of the seven survey rounds. These questions inquire about respondents' preferred levels of immigration and are stated as follows: (a) ''*To what extent do you think [country] should allow people of the same race or ethnic group as most [country] people to come and live here*? '', (b) '' *How about people of a different race or ethnic group from most [country] people*? '', and (c) ''*How about people from the poorer countries outside Europe*? ''. Responses are categorised in a 4-point scoring system [5] with 1 representing ''allow many to come and live here'', 2 ''allow some'', 3 ''allow a few'', and 4 ''allow none''. For each of the three questions, we have constructed an 'anti-immigration' variable [6], where scores are calculated by the weighted percentage of those who prefer either ''allow a few'' or ''allow none''. These three attitudinal variables represent the shares of respondents who oppose (a) immigrants of the same race or ethnic group, (b) immigrants of different race or ethnic group or (c) immigrants from poorer countries outside Europe. Based on information on 203 NUTS2 level regions, table 9 summarizes for each of the 28 European countries in our dataset the number of ESS rounds for which data at the NUTS2 level were available, the number of NUTS2 regions in each country, and the weighted averages of

[4]Following the official ESS recommendation, only the design weight, which corrects for the fact that in some countries respondents have different probabilities of being part of the sample due to the sample design used, is applied.

[5]Davidov (2015) demonstrate that the ESS measurements of anti-immigrant attitudes in the first six rounds (2002-2012) are ''sufficiently similar'' across countries to allow meaningful but cautious cross-country comparisons. Meuleman (2012) also find measurement equivalence of the (first round) ESS scale that refers to opposition against new immigration in the country.

[6]We excluded the missing values (''refusal'', ''don't know'', ''no answer'') from the sample since a low percentage (below 5 percent) of the answers to each question falls in this category. Their inclusion as anti- or pro-immigration answers does not question the robustness of the results we report. See also Hainmueller (2007) for similar treatment of missing data in the European Social Survey.

anti-immigrant attitudes for the three attitudinal variables [7].

Table 9: Weighted percentage of NUTS population with anti-immigrant attitudes (standard deviations in parentheses)

Country	ESS rounds (1)	NUTS2 regions (2)	SAME race or ethnicity (3)	DIFFERENT race or ethnicity (4)	POORER countries OUTSIDE Europe (5)
Austria	6	9	38.53 (12.40)	55.24 (10.07)	56.28 (9.832)
Belgium	3	11	26.08 (7.745)	42.18 (8.525)	44.33 (8.784)
Bulgaria	4	6	24.54 (6.007)	37.12 (6.470)	46.26 (8.388)
Croatia	2	2	35.45 (2.667)	40.50 (3.241)	43.79 (1.927)
Cyprus	4	1	49.34 (20.61)	88.46 (0.936)	91.70 (0.637)
Czech Republic	6	8	51.39 (6.766)	63.24 (8.078)	63.28 (9.493)
Denmark	7	5	17.90 (4.619)	42.46 (7.712)	53.45 (5.986)
Estonia	6	1	34.51 (6.316)	58.66 (6.014)	70.64 (2.905)
Finland	3	5	34.81 (8.800)	50.26 (14.55)	61.20 (13.79)
France	3	21	30.02 (10.01)	43.17 (10.16)	49.84 (10.22)
Greece	3	13	63.27 (14.92)	85.21 (7.713)	85.48 (7.951)
Hungary	7	7	45.67 (9.524)	80.51 (5.543)	84.93 (5.453)
Iceland	2	1	8.321 (2.699)	29.44 (5.754)	28.08 (5.143)
Ireland	6	2	31.45 (9.016)	40.89 (7.409)	44.41 (10.33)
Italy	3	20	30.56 (12.05)	38.80 (13.67)	39.53 (13.31)
Latvia	1	1	44.96 (.)	62.67 (.)	75.50 (.)
Lithuania	3	1	24.19 (4.589)	35.52 (5.962)	49.60 (9.676)
Luxembourg	2	1	37.12 (7.013)	52.70 (1.591)	51.95 (1.285)
Netherlands	7	12	34.80 (7.623)	40.71 (8.772)	47.27 (7.441)
Norway	7	7	21.91 (5.390)	36.62 (8.494)	37.74 (5.613)
Poland	7	16	25.38 (8.329)	35.47 (10.28)	35.30 (11.89)
Portugal	4	5	54.41 (13.23)	60.11 (13.04)	62.80 (9.900)
Romania	1	8	40.37 (10.30)	48.23 (8.157)	50.76 (8.420)
Slovakia	5	4	36.78 (9.541)	47.52 (9.476)	47.73 (11.61)
Slovenia	7	2	29.99 (6.354)	39.57 (6.588)	46.50 (5.581)
Spain	7	19	43.64 (15.20)	47.25 (14.84)	48.23 (15.32)
Sweden	7	8	9.415 (3.557)	13.10 (4.784)	14.34 (4.703)
Switzerland	7	7	17.91 (5.224)	37.67 (8.374)	39.59 (9.191)

Notes. Standard deviation for Latvia cannot be computed since data were available for only 1 round (due to unavailability of design weights for ESS round 3) and its NUTS2 division corresponds with the entire country. The weighted percentages refer to people who selected the two most negative categories, i.e., "allow few" and "allow none", when answering the survey questions.

In most European countries, preferences over immigration levels seem heavily contingent upon the type of (potential) immigrants. For instance, the regionally weighted percentage of survey respondents in Cyprus and Hungary expressing negative attitudes against immigrants is about 39

[7] Although participating in one or more rounds of the ESS survey, we have excluded from our analysis the following countries (and corresponding regions): (1) Israel, Ukraine and Russia, which are not covered by the NUTS and use their own regional classification; (2) Albania, as there were no related data on NUTS distances; (3) Kosovo, which is not a member state, but a potential candidate for EU accession under UNSCR 1244/99; (4) Latvia (ESS round 3), Lithuania (ESS round 4) and Romania (ESS round 3), as data on design weights were not available. Six countries (Cyprus, Estonia, Iceland, Latvia, Lithuania, and Luxembourg) have one NUTS2 region, i.e., their NUTS2 division corresponds to the entire country, and two of them (Latvia and Romania) appear in only one round due to unavailability of design weights.

and 35 percentage points, respectively, lower when referring to immigrants of the same race (Column 4) than if asked about immigrants of *different* ethnicity (Column 5). The difference is even more pronounced when opinions concern immigrants from poorer countries outside Europe (Column 6): here about 92 percent of survey respondents in Cyprus and 85 percent of those in Hungary display negative attitudes in terms of a preference for lower immigration levels of these groups. Hostility seems less dependent on those categories of immigrants in the cases of Portugal, Spain, or Sweden. For instance, the average share of respondents in Spain opposing inflows of migrants of the same race or ethnicity is nearly the same as the average share of those opposing immigrants of different race or ethnicity or from poorer countries outside Europe. Overall, Sweden appears as the most immigrant-friendly country in the sample, with only 9.41 (13.10) percent of respondents reporting a preference for lower levels of immigrants of the same (different) race or ethnic group.

As a measure of cross-regional variation in anti-immigrant attitudes over time, columns (4)-(6) of table 9 report also respective standard deviations (in parentheses). Attitudes towards immigrants of the same race or ethnicity appear remarkably heterogeneous in Cyprus, Greece, and Spain, but more clustered around the average in Croatia, Iceland, and Sweden. In Greece, for instance, the percentage of respondents showing hostility to immigrants of the same race or ethnicity oscillates between a 33.56 (Western Macedonia in 2004) lower bound and a 90.51 (North Aegean in 2004) upper bound. Attitudes towards immigrants of different race or ethnicity or towards immigrants from poorer countries outside Europe, instead, appear more dispersed around the weighted average in Finland, Italy, and Spain, but rather consistent in Croatia, Luxembourg, Cyprus, and Sweden. In Sweden, for instance, the share of those opposing immigrants of different race or ethnicity ranges between 4.25 (Middle Norrland in 2014) and 23.62 (Småland and the islands in 2004) percent. Minimum and maximum values for each country and by type of immigrants are reported in table A6 in the Appendix. Attitudes towards migrants in Europe do not seem to show a clear overall trend

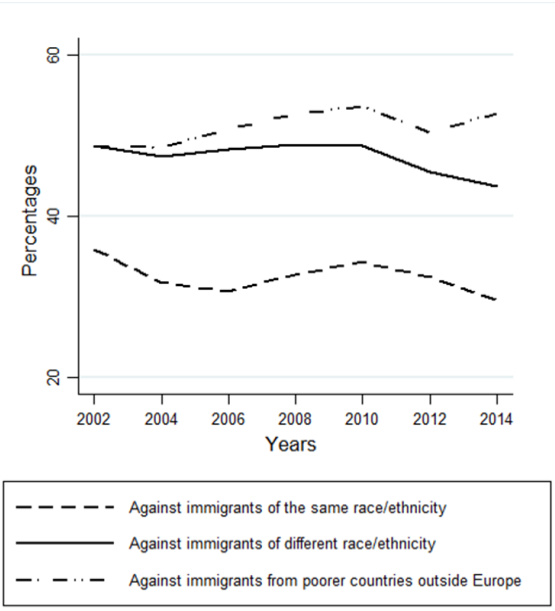


Figure 6: Anti-immigrant attitudes in Europe, 2002-2014. The vertical axis represents the percentage of anti-immigrant population in Europe and the horizontal axis indicates the respective period of time (year) for which the indicator was analysed.

between 2002 and 2014, contrary to what the past and the current state of the economy, nature of some recently adopted (restrictive) migration policies, and growing support for far-right political parties and media portrayals would suggest. Figure 6 provides an overall picture of the trends in anti-immigrant attitudes by type of immigrants in Europe.

Except for a modest upward trend between 2006 and 2010, presumably reflecting the underlying global financial meltdown and the subsequent European sovereign debt crisis, the percentage of Europeans opposing immigrants of the same (different) race or ethnicity as (from) the majority has dropped by almost 7 (5) percentage points between 2002 and 2014. Conversely, opposition to immigrants from poorer countries outside Europe has moderately but continuously increased: the percent-

age of Europeans who felt that a few or none of these migrants should be allowed to come to their countries has increased from 48 percent in 2002 to 52 percent in 2014.

Table 10 summarizes variations in anti-immigrant attitudes at the country level. Focusing on the countries where data was collected in both 2002 and 2014, only Ireland, Czech Republic and the United Kingdom have become more negative towards immigrants of the same race or ethnicity. Particularly, the percentage of Irish opponents has risen by about 14 percentage points between 2002 and 2014, while that of Czechs has almost doubled over the same period, reaching 41 percent in 2014, and that of the British has increased by 2.4 percentage points. When asked about immigrants from poorer countries outside Europe, Belgian, Danish, Dutch, Polish, Slovenian, Spanish, and Swiss respondents have been expressing increasingly hostile views, too. Variations have been quite remarkable in the case of Switzerland, where the share of immigration opponents has increased by more than 15 percentage points in 2014 relative to 2002, and rather moderate in all the remaining countries, where the rise in opposition has ranged between 3 and 9 percentage points.

The negative trend in Ireland, particularly during the period 2008-2012, might be reflective of its dramatic socio-economic situation, characterized by a significant decline in GDP growth and a concurrent sharp increase in unemployment causing massive protests and rallies. Portugal, another Eurozone member state who was severely affected by the sovereign debt crisis, with unemployment rates leaping to 16 percent in 2012 and GDP growth rates plummeting to minus 4 percent in 2012 (World Bank 2017), has also been showing increasingly more hostile attitudes towards migrants between 2008 and 2012. Spain represents a noticeable exception: despite very high unemployment, which went up to more than 24 percent in 2012 from 11 percent in 2006 (World Bank 2017), and negative or stagnating GDP growth between 2010 and 2012 (World Bank 2017), the percentage of Spanish people who felt that none or only a few immigrants should be allowed to come to their country has actually diminished considerably between 2008 and 2012.

Shifting the focus of our investigation to the sub-national level, sev-

Table 10: Country-level variation over time in anti-immigrant attitudes between 2002 and 2014

Country	SAME race or ethnicity	DIFFERENT race or ethnicity	POORER countries outside Europe
(1)	(2)	(3)	(4)
Austria	-23.625	-15.996	-9.413
Belgium	-0.601	0.825	9.425
Czech Republic	13.891	19.931	24.236
Denmark	-5.156	-6.189	5.122
France	-9.030	-7.994	-1.259
Germany	-15.921	-20.540	-10.245
Hungary	-4.668	-6.532	-2.610
Ireland	20.751	13.788	22.599
Netherlands	-7.311	-8.266	4.120
Norway	-12.314	-19.843	-6.271
Poland	-0.328	-1.345	3.828
Portugal	-19.598	-14.233	-9.504
Slovenia	-8.569	-8.152	4.270
Spain	-5.616	-0.098	1.817
Sweden	-5.518	-9.218	-2.180
Switzerland	-1.682	6.314	17.433
United Kingdom	2.382	-5.814	6.529

Notes. The table reports only the countries where data was available both in 2002 and in 2014. Figures for Belgium, France, Germany, and the United Kingdom are obtained after averaging anti-immigrant attitudes at the NUTS1 level.

eral patterns are worth highlighting. Table A7 in the appendix reports variations in anti-immigrant attitudes across all European NUTS2 regions where data were available in both 2002 and 2014.

Over this time period, all Austrian states but K′arnten, known as the stronghold state of the anti-immigrant FP′O party, have been displaying a greater openness to immigrants. In Salzburg, for example, the percentage of those with negative attitudes towards immigrants of different race or ethnicity has fallen by almost 30 percentage points, down from 68.20 percent in 2002 to 38.26 percent in 2014. Likewise, after years of strong hostility with percentages of the anti-immigrant population ranging between 50 and 80 percent, Portugal has undergone a marked shift towards more favourable attitudes in 2014, concordant with the recorded post-crisis recovery on the labour market and the country's return to economic growth. On the contrary, all Czech regions have become more opposed to inflows of migrants, regardless of their race, ethnicity, or country of origin. Swiss regions have followed this negative trend too, mainly regarding immigrants of a different race or ethnic group or from poorer

countries outside Europe as unwelcome.

In Spain, internal (Castile-Leon, Castile-La Mancha, and Madrid), north-western (Galicia and Cantabria), and eastern (Catalonia and Valencian Community) regions have generally been moving towards more positive attitudes about immigrants, while north-eastern (Navarre, La Rioja, and Aragon) and southern (Andalusia and region of Murcia) regions have increased their opposition to further immigration. In this context, various geographical clusters have emerged, with geographically more proximate regions appearing to share stronger similarities in trends of anti-immigrant attitudes than more distant ones. For example, Castile-Leon and Castile-La Mancha have been initially displaying extremely hostile attitudes towards migrants but, from 2010 onwards, contrary to what rising unemployment rates and declining per capita GDP would suggest, have been characterized by increased openness, with shares of opponents declining between 13 and 27 percentage points. Conversely, in Extremadura, Andalusia, and Region of Murcia, people's willingness to allow migrants to enter their regions dropped drastically between 2002 and 2014. Particularly, in Extremadura, the percentage of those unwilling to accept further inflows of immigrants of different race or ethnicity rose by more than 25 percentage points, from nearly 27 percent in 2002 up to almost 53 percent in 2014.

In Hungary, there appears a pattern of anti-immigrant attitudes clustered at the higher NUTS1 hierarchical level. Against trends in media coverage, Észak-Magyarorszàg, Észak-Alföld, and Dél-Alföld, which are comprised in the Alföld és Észak NUTS1 region, as well as Közép-Dunántúl and Nyugat-Dunántúl, which are part of the Dunántúl NUTS1 region, have become more open to inflows of immigrants over the period 2002-2014. The decline in anti-immigrant sentiments, however, have rather been modest; in 2014, on average, three out of four Hungarians were still unwilling to allow immigrants of different race or ethnicity and migrants from outside-Europe poorer countries to come to their regions. Facing high-level anti-immigrant attitudes already in 2002, the Közép-Magyarország region has seen further increases in hostile attitudes towards immigrants between 2002 and 2014, with the percentage of the

anti-immigrant population reaching 91 percent in 2014, a 7.35 percentage point increase compared to the already high figures recorded in 2002.

Slovenia shares a similar attitudinal trend towards more benevolence regarding the inflow of immigrants of the same or different race or ethnicity as some neighbouring regions, i.e., the Hungarian Nyugat-Dunántúl in the northeast, the Croatian Kontinentalna Hrvatska and Jadranska Hrvatska in the south and southeast, and the Austrian Burgenland and Steiermark in the north. Conversely, the percentage of Slovenians with favourable attitudes to migrants from poorer countries outside Europe has declined by almost 4 percentage points in 2014 relative to 2002. A similar trend in bifurcating attitudes, i.e., more negative towards migrants from poorer countries outside Europe and more positive towards migrants of the same or different race or ethnic group, has also characterized most of the regions in Poland and Netherlands. Particularly in Poland, exceptions concern the mid-north and eastern regions, where people's unwillingness to allow further migrant inflows has increased remarkably between 2002 and 2014 regardless of the migrant's category, and the north-western and north-central regions, where the opposite variation has occurred. Interestingly, all regions of the Nordic countries have consistently been displaying changes towards more favourable attitudes towards any type of immigrants.

Figures 7 and 10 provide an illustration of the region-specific distribution of negative attitudes towards immigrants of the *same* race or ethnicity (Figure 7) and immigrants of *different* race or ethnicity (Figure 10)[8]. Important to note is that the map in Figure 10 is markedly darker than the one in Figure 7 which indicates the fact that attitudes towards immigrants of the *same* race or ethnicity as the host country's majority population appear generally less negative than those towards immigrants of *different* race or ethnicity. Also, anti-immigrant attitudes tend to vary across regions within the same country. In Spain, for instance, the average percentage of respondents with negative attitudes towards immi-

[8]We also draw a map that depicts average attitudes towards immigrants from poorer countries outside Europe - figure B6 of the Appendix. Patterns do not seem to differ much from those of Figure 10.

grants of different race or ethnicity is noticeably high in Castilla y León, but rather moderate in Cataluña, Comunidad Valenciana, Islas Baleares, and some Northern regions such as Principado de Asturias, Cantabria, and Comunidad Autónoma del Pas Vasco. Similarly, in France, the average percentage of those preferring lower levels of immigration of different race or ethnicity fluctuates between 31 and 46.5 percent in all regions but Limousin, Burgundy, and Champagne-Ardenne, where opposition to these immigrant flows are significantly stronger. Furthermore, anti-immigrant attitudes seem to be clustered in some contiguous European (NUTS2) regions, which suggests that, by and large, spatially more proximate regions exhibit greater similarities in average anti-immigrant attitudes than more distant regions.

To explore this hypothesis further, we compute for each of the three 'groups' of immigrants the 'bilateral' difference in the percentage of respective NUTS2 populations that have anti-immigrant attitudes and regress these non-linearly against the distance between NUTS2 regions. Figure 11 displays the three fitted lines with 95 percent confidence intervals. They all indicate a positive association between the distance (in km) between regions and the differences in anti-immigrant attitudes. Interestingly, differences between European regions in negative attitudes against immigrants from poorer countries outside Europe are more marked than those towards immigrants of the same or a different race/ethnicity.

3.3.3 Data: Control variables

In order to control for other factors that the immigrant attitudes literature has identified, we use the weighted percentages of respondents at NUTS2 regions who (i) are born in the country where the interview took place (*native*); (ii) live in a rural area by choosing the response option ''country village'' or ''farm or home in the countryside'' (*rural*); (iii) are highly interested in politics (*politics*); (iv) deem it important to live in secure and safe surroundings (*safety*); (v) have high levels of interpersonal trust (*trust*); (vi) are male (*male*); and (vii) have completed more than nine years of education, with nine years denoting the typical cumulative du-

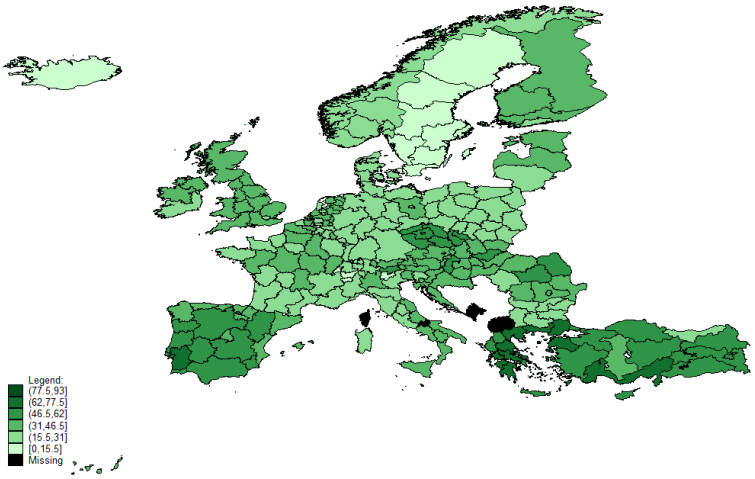


Figure 7: Geography of anti-immigrant attitudes towards migrants of the SAME race or ethnicity. Lichtenstein, Montenegro, Macedonia, and Malta - black-highlighted - do not participate in the ESS survey. There are missing data also for the French *Corsica* region. Only data for one round are available for the following: 5 Italian regions (*Molise, Provincia Autonoma di Trento, Provincia Autonoma di Bolzano, Emilia-Romagna, and Marche*), and all the regions of Romania and Latvia (due to unavailability of design weights for ESS round 3). Since the ESS provides no NUTS2 level classification for Germany, Turkey, and United Kingdom, the related averages are computed based on NUTS1 data.

ration of ISCED level 1 plus ISCED level 2 (*education*).

We have further included in the analysis the weighted average of respondents' age (*age*). Data on the unemployment rates among persons aged 15 and over (*unemployment*), as well as data on distances between NUTS2 regions and population size involved in the creation of spatial weighting matrices and spatial lag variables, are drawn from the EUROSTAT regional statistics database. Table A4 in the Appendix reports some descriptive statistics on these variables: about 93 percent of the respondents are not foreign-born; about 43 percent live in a rural area; 83.5 percent assign great importance to live in safe and secure surroundings, and slightly less than half of the respondents declare a high interest in

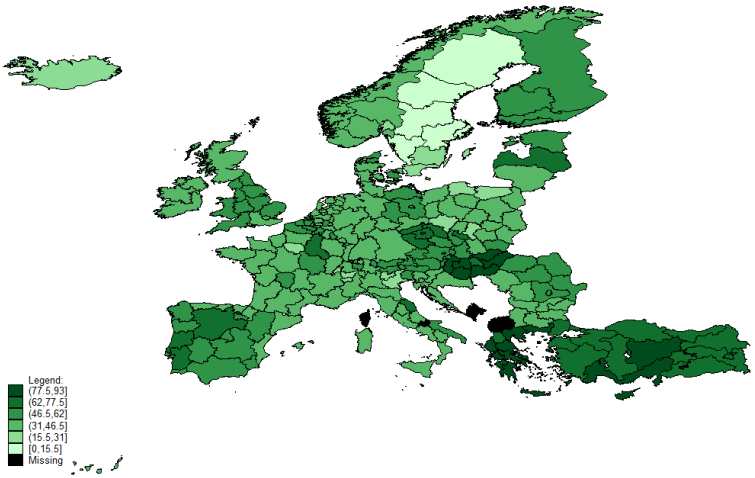


Figure 8: Geography of anti-attitudes towards immigrants of DIFFERENT race or ethnicity. Lichtenstein, Montenegro, Macedonia, and Malta - black-highlighted - do not participate in the ESS survey. There are missing data also for the French *Corsica* region. Only data for one round are available for the following: 5 Italian regions (*Molise, Provincia Autonoma di Trento, Provincia Autonoma di Bolzano, Emilia-Romagna, and Marche*), and all the regions of Romania and Latvia (due to unavailability of design weights for ESS round 3). Since the ESS provides no NUTS2 level classification for Germany, Turkey, and United Kingdom, the related averages are computed based on NUTS1 data.

politics and more than three-quarters have completed more than nine years of education.

Education is anticipated to positively influence attitudes towards immigrants via economic and non-economic channels. From an economic perspective, if assumed that the host country's labour market cannot absorb immigrants by altering its output mix, an inflow of unskilled migrants raises the supply of unskilled labour relative to other factors of production, which drives upwards skilled wages and downwards unskilled ones. Consequently, people are expected to favour immigrants with skill endowments that are dissimilar to their own. From a rather non-economic perspective, however, education is expected to have a pos-

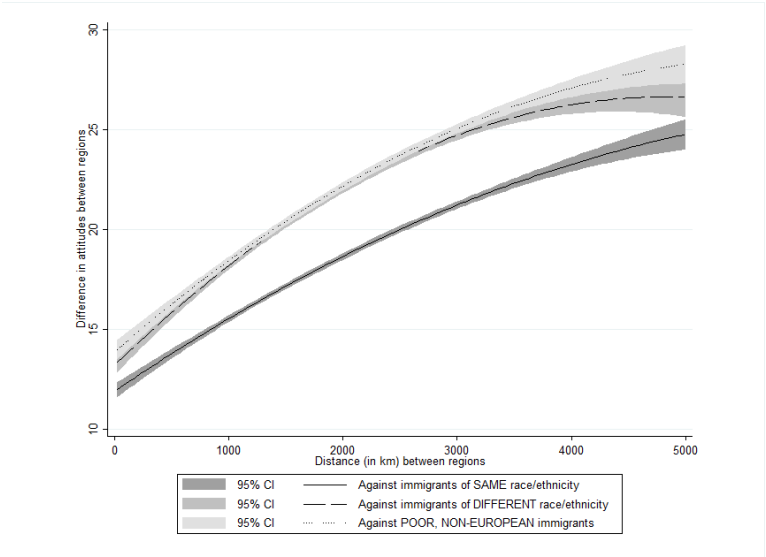


Figure 9: Size of attitudinal differences across European regions by distance. Differences in attitudes between NUTS2 regions are expressed in absolute terms.

itive impact on attitudes towards immigrants through improving the opportunities to know foreign cultures, facilitating the creation of cosmopolitan social networks, promoting higher levels of racial tolerance, and favouring more critical habits of thought (Burns (2000); Case (1989); Chandler (2001); Citrin (1997); Espenshade (1993); Hainmueller (2007, 2010)).

Interest in politics is expected to favour more positive attitudes towards immigrants via its correlation with higher education and involvement in society (Rustenbach (2010)). People with high levels of interpersonal trust are also expected to have positive attitudes as they ''may be more likely to overcome the uncertainty associated with the unknown and either establish relationships with immigrants or simply trust that the differences will not have negative consequences'' (Rustenbach (2010)). Living in rural areas is expected to be associated with heightened opposition to immigrants: unlike in big cities, rural areas offer less economic

and social opportunities, therefore attracting fewer migrants, which makes it less likely for their inhabitants to have contact with members of other groups and, consequentially enhancing opportunities for prejudice to arise (Allport (1954); Markaki (2013); Pettigrew (1998)). Living in a region or country characterised by more unfavourable economic conditions, e.g., higher levels of unemployment, is also expected to increase hostility to newcomers. Similarly, attaching greater importance to living in a secure and safe neighbourhood is expected to be associated with stronger anti-immigrant attitudes as immigrants might be perceived as a source of uncertainty, instability and insecurity and, potentially, more prone to take part in illegal activities (Rustenbach (2010)).

3.4 Results

Table 11 reports estimation results of equation 3.1, regressing the percentage of respondents who express anti-immigrant attitudes towards immigrants of the *same race* or ethnic group as the majority population (Columns 1-3); immigrants of a *different race* or ethnic group from majority population (Columns 4-6); and, immigrants from *poorer countries* outside Europe (Columns 7-9). The first model specifications (Columns 1, 4, and 7) include only spatial lag terms with NUTS level-2 fixed effects. Other specifications include further control variables and additional period fixed effects.

The estimated coefficients of the spatial lag variable, which was defined as the percentage of NUTS 2 populations in all other European regions weighted by the (inverse) distance between regions, are all positive and statistically significant. This indicates a significant spatial connectivity of anti-immigrant attitudes: more proximate European regions, in terms of geographic distance, are found to exhibit greater similarity in trends of anti-immigrant attitudes than more distant regions. These estimates corroborate the implications of the dynamic social impact theory: people tend to be more influenced by their immediate neighbours than those further away, which ''gives rise to local patterns of consensus in attitudes, values, practices, identities, and meanings[and] can lead

Table 11: Spatial dependence in sentiments against immigrants

VARIABLES	Against immigrants of the **SAME** race or ethnic group AS majority population			Against immigrants of **DIFFERENT** race or ethnicity FROM majority population			Against **POOR, NON-EUROPEAN** immigrants		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SPATIAL LAG	0.534***	0.480***	0.874***	0.493***	0.504***	0.792***	0.349***	0.431***	0.981*
	(0.145)	(0.181)	(0.246)	(0.159)	(0.163)	(0.272)	(0.127)	(0.118)	(0.568)
Native		-0.096	-0.106		0.189**	0.165*		0.288	0.311
		(0.110)	(0.108)		(0.086)	(0.092)		(0.190)	(0.194)
Male		-0.004	0.012		0.098	0.120		0.032	0.020
		(0.090)	(0.090)		(0.081)	(0.081)		(0.064)	(0.065)
Age		0.233	0.231		0.176	0.254		0.205	0.105
		(0.183)	(0.181)		(0.164)	(0.176)		(0.175)	(0.193)
Rural		0.106**	0.085**		0.179***	0.167***		0.121***	0.107**
		(0.042)	(0.042)		(0.043)	(0.045)		(0.041)	(0.042)
Politics		-0.403***	-0.423***		-0.310***	-0.334***		-0.220***	-0.232***
		(0.080)	(0.080)		(0.068)	(0.067)		(0.080)	(0.081)
Safety		0.009	-0.012		0.167**	0.147*		0.143*	0.127*
		(0.080)	(0.083)		(0.080)	(0.082)		(0.076)	(0.076)
Trust		-0.158**	-0.166**		-0.186***	-0.183***		-0.146*	-0.156**
		(0.064)	(0.069)		(0.064)	(0.067)		(0.076)	(0.078)
Education		-0.030	-0.026		-0.004	0.016		0.002	-0.043
		(0.051)	(0.049)		(0.050)	(0.053)		(0.053)	(0.053)
Unemployment rate		0.060	0.043		0.128	0.180		0.153	0.133
		(0.117)	(0.120)		(0.103)	(0.109)		(0.116)	(0.124)
Constant	15.832***	36.306**	28.040*	23.985***	-8.312	-21.057	32.188***	-12.667	-28.569
	(4.783)	(15.496)	(16.115)	(7.058)	(14.512)	(18.443)	(5.961)	(21.609)	(35.131)
Observations	968	930	930	968	930	930	968	930	930
R-squared	0.020	0.133	0.153	0.014	0.153	0.173	0.008	0.094	0.110
Number of id	203	201	201	203	201	201	203	201	201
Unit fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Period fixed effects	no	no	yes	no	no	yes	no	no	yes
NUTS level	2	2	2	2	2	2	2	2	2

Notes. Standard errors (clustered at NUTS level) in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Weighting matrix row standardized with inverse distance as weight.

initially random distributions of social attributes to become clustered in space and correlated, with less popular elements becoming consolidated or reduced in frequency but surviving in minority subgroups'' (Latané (1996)).

The row-standardization of the weighting matrix allows interpretation of the estimated coefficients of the spatial lag variable as the approximate strength of spatial interconnectedness (Plümper (2010)): a one percentage point increase in the percentage of respondents with anti-immigrant attitudes against immigrants of the *same* race or ethnicity as the majority population in spatially more proximate regions is estimated to raise the percentage of respondents with similar anti-immigrant attitudes in the reference region by 0.480 percentage points (Column 2), holding all other independent variables constant. The degree of spatial dependence becomes even stronger when period fixed effects are accounted for or when employing negative attitudes towards immigrants of *different* race or ethnicity as the dependent variable (Column 5). For instance, a one percentage point increase in the percentage of those who oppose further inflows of immigrants of different race or ethnicity in spatially closer regions is associated with a rise in the percentage of those sharing similar adverse immigrant attitudes in the region under consideration by 0.504 percentage points (Column 5).

Political interest and interpersonal trust turn out to be strong and robust predictors of anti-immigrant attitudes. Both variables exhibit negative and statistically significant estimates that remain robust across all alternative model specifications. Being (quite or very) interested in politics and more prone to trust others appear both linked to more tolerant attitudes towards *any* types of immigrants: a one percentage point increase in the share of people who are interested in politics - versus those who are not - or a same magnitude increase in the share of those with high levels of interpersonal trust -versus those who think that carefulness is never enough when dealing with other people - are associated, respectively, with a 0.403 or 0.158 percentage point fall in the share of people showing negative attitudes towards immigrants of the same race or ethnicity (Column 2), holding all other control variables constant. The

size of the effect of a one percentage point increase in the share of people interested in politics on the share of people having anti-immigrant sentiments declines though when shifting the focus of the analysis to immigrants of different race or ethnicity or to immigrants from poorer countries outside Europe, but goes up again when year fixed effects are included in the model specification.

A possible explanation for the negative sign characterizing the relationship between political interest and anti-immigrant attitudes lies in the positive correlation (see cross-correlations in table A5 in the Appendix) between political interest and higher levels of education: people with a remarkable interest in politics are more likely to display favourable attitudes towards immigrants for the same reasons as educated people do. Indeed, education 'improves the opportunities to encounter diverse social groups and cultural lifestyles, exposes members to more universalistic and cosmopolitan cultural traditions, and institutionalizes written communication that extends one's experiences beyond reference groups. In this way, education relativizes strong commitments to specific in-groups that control members' self-identification and that tend to create ''prejudiced'' cognitions and attitudes toward non-members and out-groups' (Case (1989)). Hainmueller (2007) refer to the same argument to explain the finding that people with higher education and skills are more likely to favour immigration regardless of the skill attributes of the immigrants, in contrast with the predictions of the labour-market competition hypothesis that anticipate people's opposition to immigrants with similar skills to their own and people's support for immigrants with different skill levels.

Granting greater importance to living in safe and secure surroundings seems to foster animosity towards immigrants of different race or ethnicity and towards immigrants from non-European poorer countries, but not towards immigrants of the same race or ethnicity. On average, immigrants from non-European poorer countries are more likely to be less educated, to have poorer employment prospects and to face higher barriers to economic and social integration and thus, are more likely to engage in illegal (informal) activities. The fear of potentially increasing

illegality associated with inflows of this type of immigrants might ease the formation of anti-immigrant sentiments among people who deem it critical to living in a secure and safe place relative to people who are not much or not at all concerned about security issues. Particularly, we estimate that a one percentage point increase in the share of those who value highly living in a secure and safe area (versus those who value it less) is associated with a 0.143 percentage point increase in the share of those opposing inflows of immigrants from poorer countries outside Europe (Column 8). Immigrants who are culturally or ethnically different from the host region's majority population seem to be perceived as sources of social instability and insecurity, at least more so than immigrants with similar racial or ethnic backgrounds, which may explain the existence (absence) of a positive relationship between attributing higher importance to living in a secure and safe place, and having negative attitudes towards immigrants of a different (same) race or ethnicity.

Cross-regional variation in anti-immigrant attitudes is also partly captured by the share of people living in rural areas. The estimated coefficients are all positive, highly significant, and robust across alternative specifications: for instance, a one percentage point increase in the percentage of people living in a rural area corresponds to a 0.179 increase in the percentage of people opposing higher levels of immigrants of different race or ethnicity than the majority population (Column 5). Noteworthy is also the (positive) effect of the native variable on average attitudes towards immigrants of a *different* race or ethnicity but not when attitudes refer to immigrants of the *same* race or ethnicity as the country's majority population. Overall, socio-cultural and ethnic considerations appear to weigh more than economic concerns in the formation of negative attitudes towards immigrants.

3.5 Robustness

We test the robustness of these results in various ways. First, we construct and test an alternative spatial lag variable by using contiguity rather than (inverse) distance as connectivity matrix. Second, we further

expand model specifications by including additional controls at both regional (population density and crude rate of net migration) and country levels. The population density variable is intended to capture implications of intergroup contact theory (Allport (1954)), whereas the crude rate of net migration is assumed to account for the size of the immigrant population argument. Additionally, we include migration and integration policy controls at country level (based on DEMIG POLICY and MIPEX data, respectively) which shall pick up effects of respective policy changes on attitudes towards immigrants as suggested by Schlueter (2013)[9]. Third, in order to account for the nested-level error structure, we also estimate a three-level mixed-effects model with data recorded over the period 2002 to 2014 with NUTS2 regions grouped into countries and random intercepts at both the country and the region-within-country levels. By and large, significance and magnitude of the estimated coefficients of the spatial anti-immigrant attitudes variable do not vary considerably across these specifications. The only case where the significance of the spatial lag variable disappears is when period fixed effects are included in the regression on attitudes against immigrants from poorer countries outside Europe. In all other models, spatial dependence terms remain unaffected by variation in specifications[10]. Consequently, we are confident that spatial dependence in anti-immigrant attitudes is a relevant social phenomenon that deserves further exploration.

3.6 Conclusions

Perceptions and beliefs that immigrants pose a threat to the economic, cultural, and social status quo and future prospects of the majority population have, reportedly, been playing a critical role across Europe over the past decade. European societies and institutions seem to be challenged by an increasing trend in immigration, but even more by the broadening electoral support for far-right and populist parties across Europe. This

[9]Schlueter (2013) demonstrate that immigrant integration policies that are more permissive are associated with decreased perceptions of group threat from immigrants.

[10]Results are available upon request.

trend may not only challenge the foundation and integration of the 'European project', but it has already led to some political backlash in terms of a tightening of immigration policies across Europe - even in some of the more welcoming countries. Drawing upon data from seven rounds (2002-2014) of the European Social Survey (ESS), we have performed an empirical investigation of the drivers of inter-regional differences and variation in attitudes towards three different types of immigrants: those of the same race or ethnicity, different race or ethnicity, or from poorer countries outside Europe. Our findings suggest that people who have a more marked interest in politics and a greater tendency to trust others appear associated with more tolerant attitudes towards immigrants. People who attribute greater importance to living in safe and secure surroundings and having a domicile in rural areas are found to be associated with growing hostility towards further immigrant flows.

The main contribution though of this study is the application of dynamic social impact theory (Latané (1981, 1996)) on the analysis of attitudes towards immigrants. We hereby test the existence of spatial dependence between cross-regional attitudes towards immigrants. This empirical specification has allowed us to test the concepts of immediacy and closeness in space to investigate the extent to which hostility against immigrants is dependent on the spatial distance between European regions, which may ultimately lead to a diffusion of anti-immigrant attitudes across Europe at sub-national levels. Our empirical results provide evidence for the existence of a significant spatial connectivity of anti-immigrant attitudes at sub-national levels, with spatially more proximate regions exhibiting greater similarity in anti-immigrant attitudes than more distant regions. We argue hereby that people's attitudes about immigration are influenced by the local and regional environment, which is the people they are surrounded by and are exposed to. This implies, in accordance with Tobler's first law of geography and in the spirit of Latané's social impact theory, that immigrant attitudes in one region are more influenced by respective attitudes in nearby regions than to those of more distant ones.

The identification of a spatially dependent process in the diffusion

and clustering of anti-immigrant attitudes has a significant bearing for understanding the rise and fall of populist movements across Europe and changing electoral support for xenophobic parties across European regions over time. Clustering of populations with anti-immigrant attitudes, however, may not only be influenced by xenophobic populations living in nearby regions or the presence of factors that facilitate anti-immigrant attitudes such as economic hardship or an isolated social environment, but also by internal migration or 'sorting' processes themselves. People with more liberal attitudes may move to regions with a greater presence of like-minded others, while those with more nativist attitudes may do the same. This may lead, at least to some extent and only in the long term, to a 'population re-sorting' along attitudinal categories creating spatially more homogeneous clusters of anti-immigrant populations. A test of this hypothesis, however, was beyond the scope of this study as information on bilateral migration patterns at European regional levels is currently not available.

Chapter 4

Determinants of international research collaborations, 1973-2013

4.1 Introduction

International research collaborations of individual scientists or larger research groups are a vital feature of the contemporary global scientific and innovation system. Central to creating and spreading new scientific knowledge across national and international boundaries, they spur technological progress, innovation, and ultimately, economic development.

They are closely linked to migration and mobility of scientists, too. Both short-term movements such as conference attendances, research visits, doctoral and post-doctoral studies abroad, and longer-term migration for academic employment are usually beneficial from an individual perspective. Moving overseas may increase scientific productivity through the acquisition of new knowledge and skills, but also provide access to scientific networks and new opportunities for collaboration (Katz and Martin (1997)). At the same time, while beneficial for individual scientists, the scientific capacity of institutions and former colleagues may shrink if leading scientist move abroad.

Progress in communication and transport technologies has eased considerably interactions between scientists, even when separated by great distances. However, the expectation that physical mobility would have, in turn, been replaced by long-distance virtual collaborations has not been confirmed (Stichweh (1996)). Physical co-location is still identified as a critical factor in facilitating the transfer and exchange of (tacit) knowledge through face-to-face interaction and informal communication (Katz and Martin (1997); Scellato et al. (2015); Stephan (2010)). It contributes to lessening asymmetric information among potential co-authors and to lowering both search and ''joint execution costs'' (Boudreau et al. (2017); Catalini (2017)). Yet, close spatial proximity is not always easy to attain due to such factors as travel barriers.

This paper addresses the fundamental question about the extent to which scientific migration and mobility barriers shape international research collaborations. To this purpose, we estimate gravity-type models by a Pseudo-Poisson maximum likelihood estimator (Silva and Tenreyro (2006)) through data on visa restrictions as well as information collected from Elsevier's Scopus database on the volume and direction of international scientific mobility and research collaborations while controlling for contextual factors such as bilateral trade flows, bilateral distance, common language, common colonizer, colonial historical links, and common currency. We find evidence of (i) geographical distance representing a strong obstacle for international research collaborations; (ii) common language, colonial ties and economic linkages between countries being a facilitating factor on the other hand; (iii) a positive relationship between mobility of scientists and research collaborations; and (iv) a robust deterrence effect of visa restrictions, both unilateral and bilateral, on the number of international research collaborations.

The remainder of the paper is organized as follows. Section 4.2 discusses previous studies on linkages between scientific migration and research collaborations. Section 4.3 scrutinizes academic literature on the detrimental effects of administrative barriers to mobility and their interconnectedness with research collaborations. Data are illustrated in detail in Section 4.4, whereas the empirical methodology and the estimation

outputs are debated in Section 4.5. Conclusions are then put forth in the respective section.

4.2 Scientific migration and research collaborations

Globalization as a multidimensional process manifests itself in the rapid increase of multiple forms of international flows such as capital, trade, but also information, knowledge and people (Castles et al. (2014); Held et al. (2000); Sassen (1991)). Migration systems theory proposes that one form of flow between countries or institutions, such as scientific knowledge, triggers and mutually reinforce other types of flows, such as movement of scientists (Kritz et al. (1992); Mabogunje (1970); Massey et al. (1993)). Zelinsky (1971) characterises advanced societies by the presence of significant international migration or circulation flows of highly skilled workers and professionals. For various parts of the world, this description has become a reality. The so-called brain circulation (Ackers (2005); Saxenian (2005)) with its positive connotations is a more recent trend in the controversial 'brain drain-brain gain' debate, which is ongoing since the early 1960s.

The assumption that brain circulation is a useful and desirable process and mechanism of international knowledge transfer and dissemination has been challenged by others who describe the flow of scientists as unidirectional from less to more developed (scientifically more attractive and competitive) places (Meyer et al. (2001)). Guellec and Cervantes (2001) argue that the international mobility of scientists has positive effects on skill-matches and intensified knowledge transfer, although at the cost of an uneven distribution of net benefits, which remain predominantly on the side that is already scientifically advanced. The distributional effects of international research mobility remain unclear and are still highly contested as there is insufficient evidence to ascertain whether and what regions, countries and institutions benefit more from scientific migration and mobility and which benefit rather less or lose out. Consequently, and despite the fact that international research collaborations

have intensified remarkably as scientific mobility and the interconnectedness of scientists have increased (Jeong et al. (2013); Wagner and Leydesdorff (2005)), recent studies suggest that this internationalisation of scientific activity does not necessarily benefit all countries in a similar way and extent (Castellacci and Archibugi (2008); Horlings and Van den Besselaar (2013)). We add to this discussion by investigating the extent to which scientific movements contribute to the dissemination of scientific knowledge through international research collaborations.

Migration and mobility of scientists are both a cause of international knowledge transfer but also a consequence of international differences in the scientific opportunities and research environments (Ackers (2005); King (2002); Pearson and Morrell (2002)). Several drivers have been identified as influential in scientists' migration and mobility decisions and career trajectories. For instance: the prestige and scientific quality of research institutions and universities, or even entire countries; the role of socio-scientific and professional networks (Bauder (2012); Williams et al. (2004)); economic and non-economic factors, including those related to individual life-cycles (Ackers and Oliver (2005); Czaika and Toma (2017); Stephan (2010)).

International research collaborations, on the other hand, have been growing markedly, both in magnitude and relevance, over the last decades (Adams (2005); Jones et al. (2008); Luukkonen et al. (1992, 1993); Narin and Whitlow (1990); Wuchty et al. (2007)). Previous studies have emphasized different factors to account for this remarkable upward trend: the desire to work physically closer to others to benefit from their (embodied, or rather ''em-brained'') knowledge, skills, and techniques (Beaver and Rosen (1978, 1979a,b); Katz and Martin (1997)); the deepening cross-fertilization across disciplines (Beaver and Rosen (1978, 1979a,b); Katz and Martin (1997); Melin (2000)); the increasing need to pool one's knowledge with others to tackle global complex challenges and provide original and significant contributions (Beaver (2001); Goffman et al. (1980)); the rising specialisation within certain fields (Bush and Hattery (1956); Melin (2000); Smith (1958)); the desire of researchers to enhance their popularity and visibility in the scientific community (Beaver and Rosen

(1978, 1979a); Beaver (2001); Beaver and Rosen (1979b); Katz and Martin (1997)) as well as their personal productivity and likelihood to publish in journals with higher impact factor (Freeman and Huang (2015); Katz and Hicks (1997); Lawani (1986); Wuchty et al. (2007)); or, the need to gain access to state-of-the-art facilities, instrumentation or infrastructure (Freeman et al. (2014); Katz and Hicks (1997)).

The use of e-mail, fax machines, the Internet, (multi-point) video conferencing, and the availability of high-speed train and cheaper airfares have made interactions between researchers far more accessible, even when long distances separate them. Catalini et al. (2016) find that the availability of lower flight fares is associated with a 50 percent increase in chemistry collaborations; Agrawal and Goldfarb (2008) also report a 40 percent rise, on average, in electrical engineering collaborations following the adoption of Bitnet, an Internet predecessor. However, the expectation that digitalisation and the availability of information and communication technology (ICT) would have made 'physical mobility' of scientists more superfluous, as partly replaced by long-distance virtual collaboration, has not been confirmed, but rather the contrary Stichweh (1996).

ICT is not a substitute, but rather a complement for face-to-face interactions (Gaspar and Glaeser (1996)). In a field experiment conducted within the Harvard Medical School system of hospitals and research centres, Boudreau et al. (2017) find that being in the same room during a research symposium raises by almost 70 percent the propensity of any two researchers to co-apply for a grant. Similarly, Chai (2014) documents a positive effect of temporary co-location and face-to-face interactions at conferences and subsequent long-term collaborations. Using co-publications among physicists of the French Centre National de la Recherche Scientifique (CNRS) over the period 1992-1997, Mairesse and Turner (2005) estimate that the average intensity of co-publication of researchers that belong to the same laboratory is about 40 times higher than the average co-publication intensity of those who belong to different labs, if they are in the same city; and 100 times higher than the average intensity between laboratories, if they are not in the same city. Drawing upon

a natural experiment arising from the process of labs relocation undergone by the University campus of Paris Jussieu between 1997 and 2014, Catalini (2017) find that co-located labs are 3.5 times more likely to collaborate and more similar in the topics analysed and the references they cite than separated ones.

Spatial proximity, however, is not always attainable. The ability of individual scientists of different nationalities to temporarily co-locate depends heavily on such factors as travel barriers. The scrutiny of whether and to what extent the imposition of visa restrictions affects the establishment of international collaborations among researchers represents the main object of this paper.

4.3 Visa restrictions and international research collaborations

Over recent decades, the flow of capital, goods, people, and services across national boundaries have grown noticeably (Held et al. (2000)). At the same time, governments have had to face the trade-off between entirely repealing the benefits of tourism, international trade, foreign investments, scientific, business, cultural and other exchanges on the one hand and both addressing socio-political-security concerns and maintaining control over illegal immigration on the other hand (Neumayer (2006)). Visa restrictions appear to represent a policy instrument solution to the management of this complex trade-off: they allow governments to facilitate the cross-border movement of desirable people while pre-screening and deterring the mobility of others who potentially pose a threat to the security, wealth, and identity of a country. Deterrence can either result from a visa-rejection decision or from people's unwillingness or impossibility to bear the additional (monetary and non-monetary) costs a visa application process requires (Neumayer (2010)). The assessment and quantification of the effects, both short- and long-term, of imposing restrictive visa policy regimes on passport holders from individual countries have been the focus of a relatively recent strand of research. Neumayer (2010) finds that visa restrictions reduce bilateral

travel by between 52 and 63 percent on average, with the effect being stronger on travel to developing countries than to developed ones. Neumayer (2011) employs a gravity-type model in a cross-sectional setting and provides evidence of adverse effects on foreign direct investment (FDI) and trade. He estimates a drop in FDI (trade) of up to 25 (19) percent when one country unilaterally requires a visa from the nationals of the other country. The effect on trade is still more considerable, going up to around 28 percent, for states imposing restrictions on each other. A similar-in-sign but even greater-in-magnitude impact of visas on aggregate inbound tourist flows, a 70 percent reduction, was reported by Lawson and Roychoudhury (2016). Appelt et al. (2015) identify a substantial deterrence effect of visas on bilateral international scientist flows and on the number of cross-border research collaborations in 2004: bilateral restrictions are found to reduce scientist flows (research collaborations) by 34.5 (50) percent. Orazbayev (2017) also reports an almost 18 percent reduction in international knowledge flows - proxied by the average number of citations between pairs of countries over the 2005-2008 period - due to bilateral visa restrictions.

The cross-sectional nature of these studies, however, presents several methodological shortcomings. Among others, results suffer from omitted variable bias due to the impossibility of including dyadic, origin-time and destination-time fixed effects and, thus, control for unobserved factors that might affect tourist flows, FDI, trade, scientist flows, research collaborations and knowledge flows and might be potentially correlated with the visa restriction variable. Czaika and Neumayer (2017) attempt to address this issue. Drawing upon a panel of bilateral visa data covering 194 destinations and 214 origin countries over the 1995-2013 period, they investigate the role of visa requirements on trade, FDI and tourism through estimation of a gravity-type model specification that includes a stringent set of fixed effects. Tourist inflows are reported to increase by almost 25 percent after a visa removal and to decline by about 20 percent following a visa introduction; bilateral trade and FDI are also hampered by visa restrictions, although to a lesser extent than suggested by previous cross-sectional studies. Further, some of the deterred flows

in tourists and goods and services are found to be spatially diverted to alternative visa-free destinations, thereby creating positive externalities for countries with more liberal visa policies. Czaika and Haas (2017) use a panel of bilateral data covering 38 countries over the period 1973-2012 to investigate the impact of restrictive visa policy regimes on both migration and emigration dynamics. They find that visa requirements reduce flows in either direction, encourage permanent settlement in the destination country, and lower migration's responsiveness to fluctuations in economic conditions in origin and destination countries. They also identify asymmetries in the way migration flows react to visa introductions and removals: while removals cause an almost immediate increase in migration movements, the (statistically significant) effects of visa introductions become visible after no less than five years.

Our paper contributes to this literature by assessing the potentially detrimental effects of visa restrictions on the intensity of international research collaborations between individual (co-authoring) researchers. We extend the analysis in Orazbayev (2017) and Appelt et al. (2015) by a longitudinal dimension using a global scale panel data structure covering the past four decades since the early 1970s for 194 x 214 country dyads which allows a rigorous identification strategy and econometric specification.

4.4 Data and some descriptive insights

Our analysis uses information on the volume and direction of international scientific mobility and research collaborations on a global scale. This information does not exist in any other format than bibliometric data. Elsevier's Scopus database is henceforth an ideal source of information as it is one of the largest repositories of scientific publications adding currently about three million new scientific articles, books, books chapters and other documents every year (Czaika and Orazbayev (2018)). We, therefore, consider information from this database to be a suitable source for creating our two primary variables of interest. First, we can identify the number of scientists moving between research institutions within

and across countries by full names and institutional affiliation data of all co-authors indicated in original scientific articles (Moed and Halevi (2014); Moed et al. (2013)). This information enables tracking of research-active scientists over time and across countries. An author who moves from one institution to another in a different country and keeps on publishing enters our dataset as an international scientific migrant[1]. This method allows capturing the direction (institution and country of origin and destination) and the volume of bilateral movements of research-active scientists, i.e. those who have published at least one article in an international journal listed in Elsevier's Scopus database. It captures scientific mobility after the first publication, which is in most cases during or towards the end of a doctorate, or at the latest, in the early phase of a post-doc.

Second, we use the same bibliometric data source also for identifying international research collaborations between two (or more) researchers based in different countries. Multiple studies have used co-authorship and affiliation information as indicators of research collaborations (Abramo (2012); Acedo (2006); Laband and Tollison (2000)), but no evidence exists on the linkage between scientific mobility and the creation of collaborative scientific networks. From a methodological perspective, the combination of bibliometric data regarding collaboration networks (i.e. co-authored scientific output) and scientific migration (i.e. changing author affiliations) is unique and has the advantage of global coverage over the past four decades since the early 1970s.

Figure 10 displays the emergence of global centres and peripheries of scientific activity with Western Europe and North America as the dominant regions of scientific production and collaboration. About two-thirds of all scientific publications worldwide are written with at least one (co-

[1]If information on the country of affiliation is missing for any given year, then this information has been inferred based on past and future countries of affiliations basically using two approaches. The forward-fill approach assumes that an author did not change the country of affiliation during research-inactive years, i.e. during the years without new publications; the backwards-fill approach assumes that the author changed the country of affiliation one year after the last identified affiliation. Once the information on each author's country of affiliation in every year was obtained, international migration was identified and coded whenever the author changed the country of affiliation

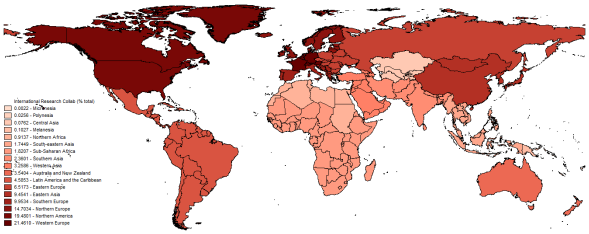


Figure 10: Number of international research collaboration (% total), 1973-2013

)author from either Europe or North America reflecting the global imbalances in scientific capacity and degree of international scientific participation. However, this global pattern is continuously shifting towards the Eastern hemisphere, with East Asia in particular, but also South-East Asia, the Gulf region and Eastern Europe having the highest average growth rates in the number of international collaborations (Figure 11). The alleged catching-up process has accelerated during the recent two decades, with countries in the Southern hemisphere playing a major role in this assumed convergence process (Figure B7 in the appendix). Apparently, these world regions started their growth process from a shallow level, which makes growth in absolute terms relatively modest. Research institutes and universities in the Western hemisphere are still actors with their research staff being highly interconnected across borders and between institutions. This interconnectedness reflects a high degree of collaborative power leading to the top productivity in scientific output. However, this dominance seems gradually shifting, or rather expanding, towards institutions in the Near and the Far East which is also reflected by the growing attractiveness of these regions for international scientists (Czaika and Orazbayev (2018)).

Information on the existence of a mobility barrier between country pairs comes from the recently established DEMIG (Determinants of International Migration) VISA database, compiled at the International Migration Institute, University of Oxford, which covers 194 destination and 214 origin countries over the 1973 to 2013 period and is based on orig-

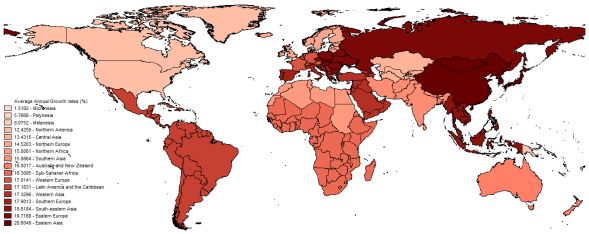


Figure 11: Average Annual growth rates, 1973-2013

inal data from the Travel Information Manuals[2] of the International Air Transport Association (IATA). Dyadic (bilateral) visa policy is coded zero if no visa for general travel purposes (e.g. tourism or social visits) is required for the targeted nationality, and one if a visa permit is required for the respective passport holder.

We have re-coded information from this visa database and measure visa restrictiveness as a discrete variable that takes on three values: 0 if there are no barriers to people's mobility between two countries; 1 if only a member of the pair imposes a restriction on movements from the other (unilateral restriction); 2 if both countries of the pair hinder mobility reciprocally (bilateral restriction). To control for possible asymmetries in the direction of a visa policy change, we further create two dummies: visa introduction and visa removal. The former equals 1 when the visa restriction variable switches from 0 to 2 or from 1 to 2, and 0 otherwise. Visa removal is equal to 1 when the visa restriction variable switches from 2 to 1, or from 2 to 0, and 0 otherwise. Table 12 shows that in more than half of all dyad-year observations bilateral visas were required, whereas only 13.03 percent were visa-free. We also report 62492 occurrences of visa introductions versus 70708 visa removals:

[2]The IATA travel manuals are released on a monthly basis. The DEMIG VISA database contains information on visa and exit requirements from 1973-2013 taken from the January edition. The database does not distinguish between visa regulations for different lengths of stay. Visa exemptions for holders of residence permits in the country of visa issuance or other countries as well as diplomatic passports or other exemptions that are not for normal, tourism-related purposes, are not considered. Likewise, the database does not distinguish between visas that need to be applied for in advance and visas that can be granted upon arrival in a country.

more travel barriers have been removed than erected over the past four decades, which underlines governments' move towards more liberal policies to facilitate cross-border movements of people.

Table 12: Bilateral VISA policies

Variables	Dyad-years	Percentage
Absence of VISA restrictions	76851	13.03
Unilateral VISA restrictions	101295	17.18
Bilateral VISA restrictions	305969	51.89
Unobserved VISA restrictions	105494	17.90
TOTAL (non-missing)	**484115**	**82.10**
VISA introductions (incidences)	62492	10.6
VISA removals (incidences)	70708	11.99

Besides data on research collaborations and scientific mobility, we collect information on dyad-specific contextual or structural variables from CEPII's database: bilateral nominal trade flows, bilateral distances, dummy variables indicating whether the two countries of the dyad (i) share a common official o primary language; (ii) have had a common colonizer after 1945; (iii) share a common currency; and (iii) have ever been in a colonial relationship. Bilateral distance, trade volumes and the number of mobile scientists all enter our regressions in a logarithmic form[3]. Summary statistics of all variables employed in the analysis are displayed in Table 13.

4.5 Empirical strategy and findings

In addition to the analysis of how scientific migration and mobility drive the evolution and dissemination of international research collaborations, we test hypotheses on the relative importance of geographical, political, cultural, and linguistic factors, and investigate whether visa policy restrictions work as mobility barrier indirectly shaping the directions and

[3]To avoid loss of observations, we add +1 to these count variables before taking the logarithms.

Table 13: Descriptive statistics

Variables	Mean	Std. Dev.	Min	Max	Obs
Research collaborations	18.04	212	0	24686	404568
VISA restrictions	1.473	0.753	0	2	484115
Log scientist mobility	0.498	1.054	0	8.705	224489
Log trade	11.09	7.104	0	26.67	459152
Log distance	8.746	0.763	4.107	9.892	582649
Common language	0.175	0.380	0	1	582649
Common colonizer	0.119	0.323	0	1	582649
Colonial relationship	0.0138	0.117	0	1	582649
Common currency	0.0127	0.112	0	1	582649

dynamics of international research collaborations[4].

We identify visa effects by employing the most stringent econometric specification that dyadic panel data allow, namely the inclusion of dyad fixed effects in combination with time fixed effects that vary for origin and destination country. Such a specification excludes the possibility that unobserved time-invariant heterogeneity across dyads, as well as time-varying heterogeneity across countries, bias the estimated effects (Anderson and Van Wincoop (2003); Baier and Bergstrand (2007)). Using a Pseudo-Poisson maximum likelihood (PPML) panel estimator, we estimate a structural gravity-type model including time-invariant contextual variables before assessing the effect of scientific mobility and visa restrictions in the most rigorous specification incorporating a full set of country- and dyad-specific fixed effects which exclude any substantive control variables:

$$\begin{aligned} lnRC_{ijt} = \beta_1 + \beta_2 visa_{ijt} + \beta_3 lnsci\_mobility_{ijt} + \beta_4 visa_{ijt} * \\ * lnsci\_mobility_{ijt} + \delta * X_{ij} + \eta_{ij} + \gamma_{it} + \theta_{jt} + \epsilon_{ijt} \end{aligned} \tag{4.1}$$

where $lnRC_{ijt}$ is the natural log of dyadic research collaborations, measured by the number of scientific publications co-authored by one or more researchers from country *i* and country *j* in year *t*. $visa_{ijt}$ is

[4]Policy variables have only recently been incorporated in quantitative tests on overall migration flows (Czaika and Haas (2017); Mayda (2010); Ortega and Peri (2013)) or high-skilled migration (Czaika and Parsons (2017)), and science policy (Publishing (2014)).

a discrete variable that is coded depending on whether the dyad was visa-free in both directions (0), bilaterally visa-constrained (2), or only unilaterally constrained (1). The log of $sci\_mobility_{ijt}$ captures the number of research-active scientists moving from an institution in country i to an institution in country j in year t. We also interact visa restrictions $visa_{ijt}$ with $lnsci\_mobility_{ijt}$ to identify whether the effect of scientific mobility on the number of dyadic research collaborations is dependent on the existence of mobility barriers. In addition to these key variables of interest, we also control for other structural dyadic variables X including geographical distance, colonial ties, common coloniser, common language, common currency, and bilateral trade volume. We further minimise the risk of an omitted variable bias, we include in our three-dimensional panel data structure model the maximum number of dyadic and country-time fixed effects, i.e. η_{ij} representing dyad fixed effects, γ_{it} and θ_{jt} capturing country-specific year fixed effects, and ϵ_{ijt} as an idiosyncratic error term[5]. The identification assumption is that $visa_{ijt}$ is uncorrelated with the error term conditional on the dyad-specific, and country-specific year fixed effects. The global coverage of our (unbalanced) dataset with 194 x 214 country pairs also minimises a potential sample selection bias so that we have high confidence in the reliability and validity of the identified estimates. The only possible bias may stem from dyadic variation over time which may be correlated with either the visa policy or the scientific mobility variables. This design eliminates all other potential sources of bias.

Table 14 reports estimation outputs of gravity-type models with country-year fixed effects (columns 1-5) and the most stringent set of fixed effects (columns 6-7). Model 1 only includes the core set of contextual gravity variables which by and large show the expected effects. Geographical distance is a robust obstacle for international research collaborations; for doubling distance between countries results in about 13 to 45 percent less co-authored publications. Besides proximity, common language and

[5]The dyad fixed effects account for the time-invariant multilateral resistance, whereas the country-specific year fixed effects account for time-varying multilateral resistance (Bertoli and Moraga (2013)).

colonial ties are other facilitating factors of international research collaborations. High connectivity and economic linkages between countries, captured by the bilateral trade variable, is another structural factor enhancing other flows along the propositions of migration systems theory (Kritz et al. (1992); Mabogunje (1970)). This implies that scientific connections regarding research collaborations and scientific mobilities follow existing structural pathways between countries.

Table 14: Determinants of international research collaborations: scientific migration and VISA policies (PPML estimation)

DV: Research collaborations	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log distance	-0.450***	-0.283***	-0.122***	-0.115***	-0.129***		
	(0.006)	(0.010)	(0.006)	(0.005)	(0.006)		
Common language	0.360***	0.290***	0.013	0.008	0.007		
	(0.018)	(0.017)	(0.010)	(0.009)	(0.009)		
Common colonizer	0.430***	0.514***	0.313***	0.262***	0.263***		
	(0.044)	(0.039)	(0.027)	(0.027)	(0.028)		
Colonial relationship	0.236***	0.222***	-0.048***	-0.041***	-0.019*		
	(0.017)	(0.015)	(0.009)	(0.010)	(0.010)		
Common currency	0.034	-0.004	-0.027**	-0.033***	-0.041***		
	(0.021)	(0.019)	(0.011)	(0.011)	(0.010)		
Log trade		0.165***	0.082***	0.086***	0.082***	0.018***	
		(0.008)	(0.004)	(0.003)	(0.003)	(0.005)	
Log scientist migration			0.470***	0.452***	0.423***	0.054***	
			(0.006)	(0.005)	(0.005)	(0.008)	
Unilateral VISA restrictions				-0.095***	-0.276***	-0.065**	
				(0.009)	(0.018)	(0.031)	
Bilateral VISA restrictions				-0.200***	-0.488***	-0.246***	
				(0.015)	(0.021)	(0.038)	
Unilateral*Log scientist migration					0.040***	0.012*	
					(0.004)	(0.006)	
Bilateral*Log scientist migration					0.068***	0.056***	
					(0.005)	(0.009)	
Post-visa removal (time dummy)							0.043***
							(0.009)
Post-visa introduction (time dummy)							-0.058***
							(0.013)
Observations	301575	277317	171000	153781	153781	154463	258458
R^2	0.928	0.937	0.983	0.989	0.988	0.997	0.997
i-year FE	yes	yes	yes	yes	yes	yes	yes
j-year FE	yes	yes	yes	yes	yes	yes	yes
ij FE	no	no	no	no	no	yes	yes

Notes. Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Furthermore, across different specifications, scientific migration and mobility show to be a significant and robust indicator and an explanatory factor of international co-authorships. A ten percent increase in the number of mobile scientists is associated with a 5 to 45 percent increase in bilateral research collaborations. The causality is not necessarily only in one direction, but the two processes of scientific mobility and

international research collaborations are mutually enhancing: scientific movement precede, concur, and succeed international scientific collaborations, and we do not attempt to disentangle these self-perpetuating effects working at different stages of international research collaboration. This finding at the global macro level is supported by recent evidence pointing to the interrelatedness of international mobility and collaborative relationships in career trajectories of Indian academics (Czaika and Toma (2017)).

Barriers to mobility in terms of visa restrictions are found to impact negatively and statistically significantly the number of international research collaborations. On average, uni-directed visa restrictions, i.e. visa restrictions imposed only for nationals of one country of a dyad but not retaliated by the other state, are associated with a 10 percent reduction in research collaborations (column 4). Bi-directed visa restrictions, i.e. nationals of both countries require a visa before entering the respective country, have even a stronger effect of an about 20 percent difference in the average number of research collaborations compared to 'average' visa-free country dyads[6].

In columns (5) and (6) we include interaction terms of visa restriction and the log of mobile scientists. The positive sign of these interaction terms suggests that migration of scientists is more relevant for facilitating international research collaborations in visa-constrained than visa-free corridors. The combined size of β_3 and β_4 indicates growing importance of existing scientific ties in situations where visa restrictions constrain bilateral mobility. This combined effect also holds in model (6) where we employ the most rigorous specification regarding the number of fixed effects.

We finally test the existence of asymmetries in the direction of a visa policy change. By identifying the years either after a visa introduction or a visa removal, respectively, we can estimate the effect of a visa policy *change* in one or the other direction. We estimate these two parame-

[6]The effect size of these two estimates declines to 2.2 percent (uni-directed) and 7.9 percent (bi-directed) in a model specification including the full set of country-year specific and dyad-specific fixed effects. Results of this regression are not shown but available on request.

ters in a specification with full inclusion of all possible fixed effects. The estimates measure the difference in the number of research collaborations before and after a visa policy change. The estimated effects indicate that visa policy changes work in the expected direction but are slightly smaller than the visa policy estimates in the other models. We estimate that on average a visa removal increases the number of research collaborations in the years after the policy change by about 4 percent, while an introduction of a visa restrictions decreases the number of research collaborations by on average almost 6 percent.

4.6 Conclusions

We report evidence of a strong deterrence effect from imposing visa restrictions on the number of international research collaborations. Trade, as a proxy for economic interconnectedness among countries, spatial proximity, and commonalities in terms of the language spoken or having had a common colonizer, all are reported to affect collaborations among scientists positively and significantly. Greater mobility of scientists is associated with a rising number of international co-authorship, although we are aware that causality might move in the other direction, too.

Scientific migration and mobility may enhance the scientific output by bringing in new ideas and experiences in different scientific areas which in turn lead to knowledge creation and spillovers (Calderini and Scellato (2005)). However, how and to what extent destination countries and institutions benefit scientifically from the recruitment of researchers from abroad remains unclear as it does not depend solely on the characteristics and scientific prowess of the individual researcher, but also on the capacity of the scientific and institutional environment to absorb researchers. It is thus still an unresolved question to what extent in-coming researchers create 'extra' knowledge. Or, to what extent does knowledge spill over to other (collaborating and non-collaborating) researchers?

The intermediating role of universities and research institutions is also still unclear. Universities and research institutions are the organisational entities, which provide the environment for self-determined

arrangements for research collaborations (Kreiner and Schultz (1993); Stichweh (1996)). Notwithstanding, scientists operate in broader institutional and social settings, and thus, the presence of specific activities at the institutional, but also the state level is critical to support scientific productivity and collaboration (Wagner et al. (2001)). For instance, there is very little evidence on the role and effectiveness of public policies to attract and select skilled migrants and researchers (Czaika and De Haas (2013); Czaika and Parsons (2017)). Also, international research collaborations are assumed to be driven by factors such as the scale of a research budget (Bohen and Stiles (1998)), the duration of a research project (Jeong et al. (2013)), academic excellence and prestige of research partners and institutions (Wagner (2005)). However, these factors have never been systematically assessed on a larger scale.

The link between scientific migration and mobility, on the one hand, and international knowledge spill-over and dissemination, on the other, is highly relevant regarding the effects of a scientific brain drain on the scientific capacity and the extent to which scientific knowledge is feeding back to origin countries. Whether, and under which conditions, scientific migration and mobility generates benefits or constitutes a detrimental so-called brain drain for origin countries and institutions depends largely on the intensity of scientific collaboration and knowledge exchange between interconnected scientific communities in origin and destination countries, in which mobile scientists bridge institutions and facilitate the transfer of scientific knowledge.

Appendix A

Tables

Table A1: Number of occupied housing units among members of the language groups.

	Total	Italian	German	Ladin
Pre-1919	27251	4517	21562	1172
		(0.166)	(0.791)	(0.043)
1919-1945	12631	7066	5141	424
		(0.559)	(0.407)	(0.033)
1946-1960	23439	10806	11731	902
		(0.461)	(0.500)	(0.038)
1961-1970	32133	13313	17545	1275
		(0.414)	(0.546)	(0.040)

Note. Figures come from the 1981 Census of Population and Housing, pertain to all municipalities in the province of Bolzano and are split according to the linguistic group of the housing units' occupants. Shares at language group level are reported in parentheses for each period.

Table A2: Total (and shares) of population and linguistic groups by activity sectors in 1961

	Total population		Italians		Germans		Ladins	
Activity sector	No. people	Pop. share (%)	No. people	Share (%)	No. people	Share (%)	No. people	Share (%)
Total population	160011	100	54959	100	99626	100	5426	100
Agriculture	48996	30.6204	2326	4.2322	44614	44.7815	2056	37.8916
Building	11724	7.3270	5655	10.2895	5770	5.7917	299	5.5105
Industry	32007	20.0030	15693	28.5540	14803	14.8586	1511	27.8474
Public administration	14789	9.2425	11148	20.2842	3462	3.4750	179	3.2989
Services	18784	11.7392	6252	11.3758	11998	12.0430	534	9.8415
Trade	27024	16.8888	9222	16.7798	17053	17.1170	749	13.8039
Transp-communications	6687	4.1791	4663	8.4845	1926	1.9332	98	1.8061

Notes. Data are taken from the Census of Population, 15 October 1961, Volume III - Province of Bolzano.

Table A3: The Italianization channel — overidentified 2SLS estimates

	Dependent variable is: MSI vote share		
	OLS estimates	2SLS estimates	
		second stage	first stage
	(1)	(2)	(3)
$I(South\,Tyrol) \times post_{1966}$	6.117***	7.254***	2.488***
	(2.289)	(2.414)	(0.804)
$I(South\,Tyrol) \times post_{1966} \times \%Italians$	-0.145**	-0.221***	
	(0.060)	(0.079)	
$I(South\,Tyrol) \times post_{1966} \times migrations\,1930s$			0.000338*
			(0.000182)
$I(South\,Tyrol) \times post_{1966} \times publ.\,housing\,1930s$			59.960***
			(6.903)
$I(South\,Tyrol) \times post_{1966} \times railway\,routes$			6.997**
			(3.416)
Hansen J statistic		0.007	
Kleinbergen-Paap F statistics			120.651
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Comune FE	Yes	Yes	Yes
Observations	1527	1520	1520
R^2	0.049	0.048	0.867

Note. Dependent variable is the vote share of the Movimento Sociale Italiano (MSI). The unit of observation is comune × election year. All the columns include the number of inhabitants, the group language concentration index, the share of Ladins, the number of Italians that are illiterate, the number of Italians that hold a high-school diploma as well as those that hold a University degree. They also control for the number of abstained voters and the number of blank ballot papers. Standard errors in parentheses are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Against	968	33.47	15.98	0	90.51
Against1	968	45.84	18.64	4.255	100
Against2	968	48.62	18.99	3.390	100
Spatial lag	1421	33.24	2.397	29.83	36.79
Spatial lag 1	1421	44.48	1.985	40.68	46.31
Spatial lag 2	1421	47.03	2.017	43.74	49.85
Native	968	92.76	7.121	40	100
Male	968	47.58	6.193	21.17	80.00
Age	968	46.77	3.384	29.50	62.82
Rural	968	42.62	17.28	0	100
Politics	968	43.19	14.85	0	81.82
Safety	951	83.53	11.04	49.46	100
Trust	968	41.54	19.22	0	85.71
Education	968	74.30	14.93	6.901	100
Unemployment rate	946	9.097	5.717	1.700	37

Notes. Against, Against1, and Against2 stand for, respectively, hostile attitudes towards: immigrants of the same race or ethnicity; immigrants of different race or ethnicity; immigrants from poorer countries outside Europe.

Table A5: Cross-correlation matrix of independent variables

	Spatial lag	Spatial lag 1	Spatial lag 2	Native	Male	Age	Rural	Politics	Safety	Trust2	Education	Unemployment rate
Spatial lag	1											
Spatial lag 1	0.898	1										
Spatial lag 2	0.028	0.283	1									
Native	0.131	0.102	-0.042	1								
Male	-0.039	-0.037	0.028	0.004	1							
Age	-0.209	-0.214	0.025	0.006	-0.105	1						
Rural	-0.049	-0.055	-0.018	0.099	0.076	0.081	1					
Politics	-0.084	-0.087	-0.029	-0.230	0.076	0.106	0.031	1				
Safety	0.043	0.022	-0.071	0.194	-0.165	-0.044	0.046	-0.521	1			
Trust2	-0.070	-0.061	-0.005	-0.260	0.197	0.040	0.031	0.552	-0.630	1		
Education	-0.223	-0.172	0.052	0.061	0.069	-0.282	-0.165	0.276	-0.262	0.285	1	
Unemployment rate	-0.154	-0.137	-0.018	0.074	0.004	-0.075	-0.076	-0.392	0.376	-0.428	-0.225	1

Table A6: Shares of respondents with negative attitudes towards different types of immigrants: minimum and maximum values

Country	SAME race or ethnicity		DIFFERENT race or ethnicity		POOR, NON-EUROPEAN immigrants	
	min	max	min	max	min	max
Austria	9.471	61.285	35	73.544	36.095	75.434
Belgium	10.909	38.788	24.848	55	23.529	58.108
Bulgaria	12.764	36.846	24.841	48.073	27.262	63.825
Croatia	32.246	37.824	36.848	44.510	41.253	45.403
Cyprus	19.799	65.545	87.540	89.652	91.032	92.495
Czech Republic	29.070	65.882	41.506	77.995	42.240	81.070
Denmark	7.672	25.333	26.136	54.545	40	62.069
Estonia	27.970	41.525	53.058	65.750	67.513	75.164
Finland	14.286	46.154	14.286	65.368	21.429	73.377
France	13.629	60.739	25.653	71.134	26.150	76.561
Greece	33.566	90.511	64.336	100	60.839	100
Hungary	28.049	63.014	65.513	91.071	72.689	95.851
Iceland	6.413	10.229	25.373	33.511	24.447	31.720
Ireland	19.514	48.913	28.046	54.826	32.200	67.818
Italy	0	58.824	18.156	80	9.590	61.111
Latvia	44.962	44.962	62.671	62.671	75.497	75.497
Lithuania	19.131	28.089	29.295	41.179	41.428	60.283
Luxembourg	32.164	42.081	51.577	53.826	51.037	52.854
Netherlands	18.939	60.869	22.727	65.217	34.351	68.852
Norway	12.113	33.693	18.644	51.111	26.829	49.258
Poland	6.549	46.569	16.468	63.401	11.956	69.157
Portugal	23.222	75.784	31.304	89.603	40.529	87.035
Romania	21.377	51.809	32.732	58.445	33.833	62.655
Slovakia	13.571	51.393	24.286	63.164	27.465	73.953
Slovenia	23.218	43.199	29.448	50.820	38.412	55.025
Spain	0	85.329	12.827	85.329	12.827	100
Sweden	2.885	17.526	4.255	23.626	3.390	29.412
Switzerland	8.584	32.247	19.174	52.734	18.840	67.347

Notes. Min and max denote, respectively, the minimum and maximum shares of respondents with negative attitudes towards different types of immigrants within each country over the 2002-2014 period. For instance, with reference to Austria, the share of those who are against immigrants of the same race or ethnic group ranges between 9.47% (minimum value recorded in an Austrian region at a specific time) and 61.28% (maximum value recorded in another (or the same) Austrian region at a specific time).

Table A7: NUTS2-level differences in anti-immigrant attitudes between 2002 and 2014

Country	NUTS2 region	Differences in anti-immigrant attitudes		
		SAME race or ethnicity	DIFFERENT race or ethnicity	POORER countries outside Europe
(1)	(2)	(3)	(4)	(5)
Austria	Burgenland	-26.808	-13.876	-20.076
	Niederösterreich	-25.458	-22.844	-13.343
	Wien	-27.286	-17.280	-9.752
	Kärnten	-5.839	2.989	5.490
	Steiermark	-31.482	-19.232	-5.268
	Oberösterreich	-9.357	-10.694	0.770
	Salzburg	-47.977	-29.949	-25.097
	Tyrol	-20.184	-17.005	-14.240
	Vorarlberg	-18.231	-16.069	-3.203
Czech Republic	Prague	33.430	35.037	36.115
	Středn Čechy	17.866	25.362	32.331
	Jihozápad	8.070	11.520	11.974
	Severozápad	3.908	19.043	27.326
	Severovýchod	7.026	15.704	20.682
	Jihovýchod	5.996	12.561	23.444
	Středn Morava	14.899	19.475	18.977
	Moravskoslezsko	19.933	20.747	23.042
Denmark	Hovedstaden	-9.571	-14.001	-0.557
	Sjælland	-4.341	-8.697	1.421
Hungary	Közép-Magyarország	9.654	1.514	7.352
	Közép-Dunántúl	-19.700	-8.896	-5.962
	Nyugat-Dunántúl	18.966	-10.720	-12.302
	Dél-Dunántúl	-9.708	1.083	4.128
	Észak-Magyarország	-8.207	-4.344	-7.541
	Észak-Alföld	-13.203	-8.291	1.723
	Dél-Alföld	-10.478	-16.071	-5.672
Ireland	Border, Midland and Western	29.399	17.823	27.036
	Southern and Eastern	12.102	9.752	18.161
The Netherlands	Groningen	-6.795	-5.627	2.696
	Friesland	-15.591	-17.712	-12.413
	Drenthe	-9.771	-18.618	4.329
	Overijssel	-0.929	-3.503	5.375
	Gelderland	-5.529	-8.338	3.877
	Flevoland	-6.768	-11.615	3.169
	Utrecht	-8.763	-11.289	4.344
	North Holland	-5.892	-6.740	2.906
	South Holland	-14.954	-14.361	-0.377
	Zeeland	4.476	11.016	21.158
	North Brabant	-15.151	-16.862	-3.890
	Limburg	-2.067	4.461	18.258
Norway	Oslo og Akershus	-7.094	-18.280	-4.449
	Hedmark og Oppland	-12.481	-24.264	-10.568
	Sør-Østlandet	-12.886	-19.349	-3.488
	Agder og Rogaland	-11.164	-16.883	-2.387
	Vestlandet	-13.747	-21.504	-12.030
	Trøndelag	-17.625	-24.339	-5.567
	Nord-Norge	-11.198	-14.281	-5.409

(Continued)

Table A7: NUTS2-level differences in anti-immigrant attitudes between 2002 and 2014 *(continued)*

Country	NUTS2 region	Differences in anti-immigrant attitudes: SAME race or ethnicity	DIFFERENT race or ethnicity	POORER countries outside Europe
(1)	(2)	(3)	(4)	(5)
	Łódzkie	-1.124	-2.645	9.156
	Mazowieckie	-5.516	-8.487	3.897
	Małopolskie	-6.721	-8.466	6.057
	Ślaskie	0.412	-0.850	6.762
	Lubelskie	3.118	8.395	11.945
	Podkarpackie	2.076	-4.801	10.127
	Świetokrzyskie	-14.819	-13.886	-15.920
Poland	**Podlaskie**	18.060	6.585	15.417
	Wielkopolskie	0.696	-0.300	-1.763
	Zachodniopomorskie	-15.250	-9.780	-8.642
	Lubuskie	14.585	9.795	20.521
	Dolnośląskie	-0.350	-2.096	6.742
	Opolskie	2.921	1.299	-4.348
	Kujawsko-Pomorskie	3.770	11.134	6.962
	Warmińsko-Mazurskie	8.696	7.884	5.741
	Pomorskie	-15.803	-15.294	-11.399
Slovenia	**Vzhodna Slovenija**	-13.114	-6.962	4.035
	Zahodna Slovenija	-4.025	-9.341	4.504
	Galicia	-20.270	-23.428	-22.800
	Asturias	23.710	25.751	25.595
	Cantabria	-38.490	-17.748	-20.668
	Basque Community	12.087	15.797	21.608
	Navarre	10.649	8.304	-2.639
	La Rioja	-12.534	16.438	1.765
	Aragon	3.880	5.309	-0.833
	Madrid	-16.580	-13.413	-9.437
Spain	**Castile-Leon**	-12.940	-22.096	-13.494
	Castile-La Mancha	-26.961	-25.616	-27.720
	Extremadura	33.014	25.346	32.382
	Catalonia	-11.101	-5.241	-5.443
	Valencian Community	-32.415	-26.961	-25.131
	Balearic Islands	19.405	28.508	18.567
	Andalusia	10.398	13.451	9.106
	Region of Murcia	12.111	24.382	14.068
	Canary Islands	-1.320	-10.672	-10.352
	Stockholm	-1.887	-4.569	-3.059
	Östra Mellansverige	-6.297	-8.890	-1.391
	Småland med öarna	-1.926	-6.300	-0.735
Sweden	**Sydsverige**	-7.174	-10.937	-1.437
	Västsverige	-7.285	-11.191	-1.859
	Norra Mellansverige	-12.296	-15.302	-8.040
	Mellersta Norrland	-6.332	-10.030	2.189
	Övre Norrland	-0.949	-6.527	-3.109

(Continued)

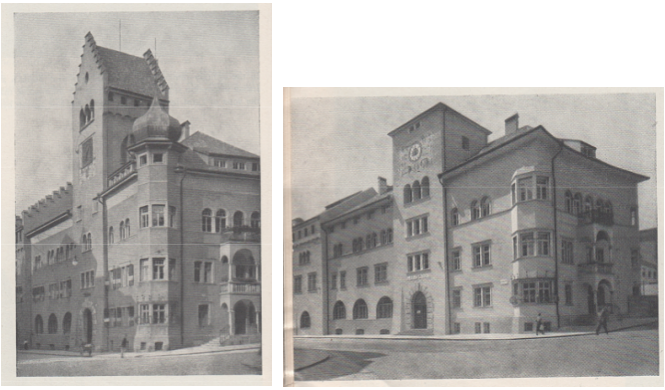
Table A7: NUTS2-level differences in anti-immigrant attitudes between 2002 and 2014 *(continued)*

Country	NUTS2 region	Differences in anti-immigrant attitudes		
		SAME race or ethnicity	**DIFFERENT race or ethnicity**	**POORER countries outside Europe**
(1)	(2)	(3)	(4)	(5)
	Genferseeregion	-0.124	7.249	12.460
	Espace Mittelland	0.698	5.506	12.180
Switzerland	**Ostschweiz**	-8.945	-3.215	12.447
	Zentralschweiz	-1.578	9.160	29.714
	Tessin	8.335	13.747	24.489

Notes. The table reports only the NUTS2 regions where data were available both in 2002 and in 2014. The following countries (with all, if not specified, or some regions, if specified) are not included in the table but are part of the estimation sample: Belgium (ESS 5-7); Bulgaria (ESS 3-6), Croatia (ESS 4-5); Cyprus (ESS 3-6), Denmark (Southern Denmark (DK03), Midtiylland (DK04) and Nordiylland (DK05): ESS 4-7), Estonia (ESS 2-7), Finland (ESS 5-7, excluded South Finland (FI1C) and Aland (FI20) for which data were available for rounds 6 and 7); France (ESS 5-7); Greece (ESS 1, 2 and 5); Iceland (ESS 2-6); Italy (ESS 1-2 and 6, excluded Valle D'Aosta (ITC2) for which data were available only for round 1 and Provincia Autonoma di Bolzano (ITH1),), Provincia Autonoma di Trento (ITH2), Emilia-Romagna (ITH5), and Marche (ITI3) for which data were available only for round 6); Latvia (ESS 4); Lithuania (ESS 5-7); Luxembourg (ESS 1-2); Portugal (ESS 4-7); Romania (ESS 4); Slovakia (ESS 2-6); Spain (Ceuta (ESS 3, 6 amd 7) and Melilla (ESS 4, 5 and 7); Switzerland (Grossregion Nordwestschweiz (CH03) and Zurich (CH04): ESS 2-7). Lastly, the following regions are not part of the estimation sample: Molise (ITF2), Regiao Autonoma dos Aores (PT20), Regiao Autonoma de Madeira (PT30), Corsica (FR83), Guadeloupe (FRA1), Martinique (FRA2), French Guiana (FRA3), La Réunion (FRA4), Mayotte (FRA5), and "Extra-Regio" NUTS2 regions .

Appendix B

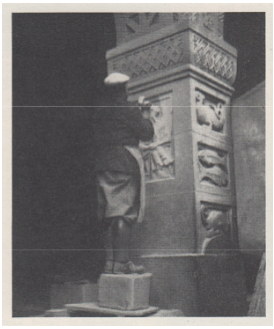
Figures



(a) Before (b) After

Figure B1: The Italianization of South Tyrol during the Fascist regime. Reshaping of the museum building in Bolzano. (*source:* Fingeller, 1938).

(a) No German allowed on gravestones



(b) Scratching reliefs from Tyrolean monuments

(c) Erecting Italian monuments

Figure B2: The Italianization of South Tyrol during the Fascist regime. (*source:* Fingeller, 1938).

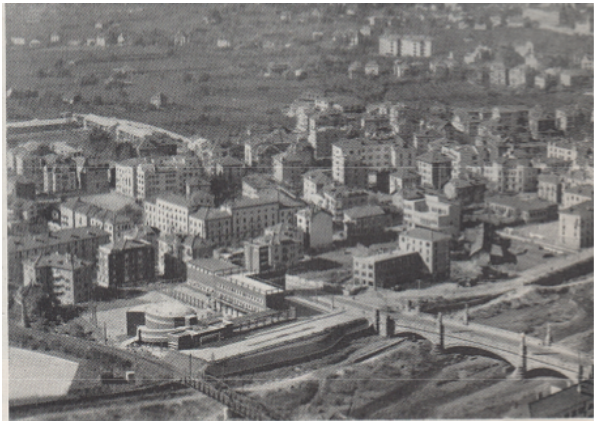


Figure B3: New Italian quarter built in Bolzano during the 1930s. (*source:* Fingeller, 1938).

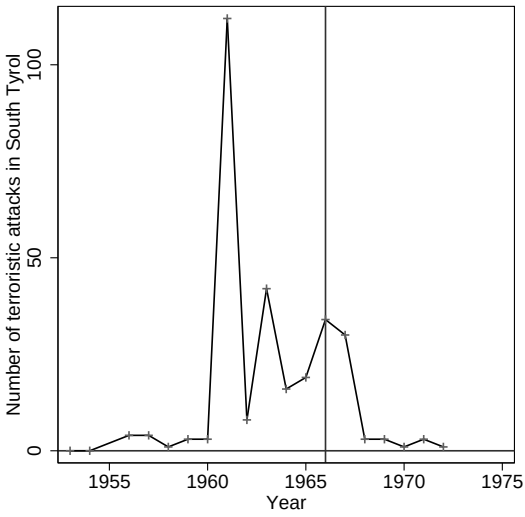


Figure B4: Number of terroristic attacks in South Tyrol between 1956 and 1972.

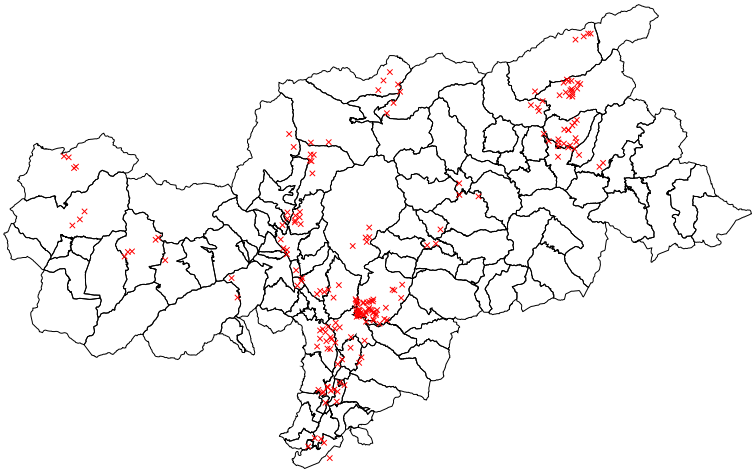


Figure B5: Spatial distribution of the terroristic attacks in South Tyrol between 1956 and 1972.

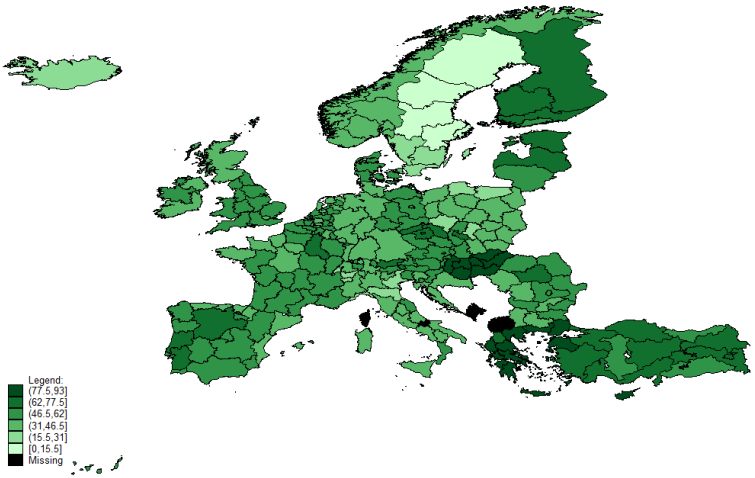


Figure B6: Average attitudes towards immigrants from POORER countries OUTSIDE Europe. Lichtenstein, Montenegro, Macedonia, and Malta - black-highlighted - do not participate in the ESS survey. There are missing data also for the French *Corsica* region. Only data for one round are available for the following: 5 Italian regions (*Molise, Provincia Autonoma di Trento, Provincia Autonoma di Bolzano, Emilia-Romagna, and Marche*), and all the regions of Romania and Latvia (due to unavailability of design weights for ESS round 3). Since the ESS provides no NUTS2 level classification for Germany, Turkey, and United Kingdom, the related averages are computed based on NUTS1 data.

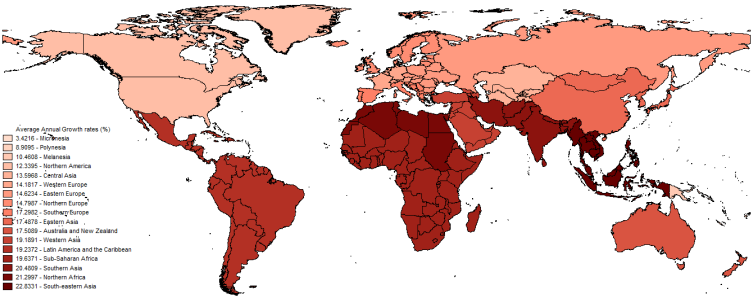


Figure B7: Average Annual growth rates, 1993-2013.

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